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DEPARTMENT OF ECONOMICS
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DEPARTMENT OF EDUCATION

DEPARTMENT OF LABOUR

ONTARIO ECONOMIC COUNCIL



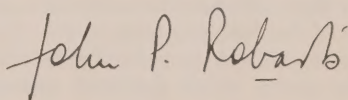
FOREWORD

The accelerated pace of technological change in Ontario and Canada requires adjustments in our social and economic structures. Some of these adjustments can be made more readily through provincial government action while others must become the responsibility of labour, management, other levels of government or of outside institutions.

The Conference on Automation and Social Change was called to bring together expert speakers and interested delegates from each of these areas of our society to delineate the problems which must be faced and to set up the groundwork for their eventual solution.

Some steps have already been taken by the Ontario Government through the activities of the Select Committee on Manpower Training and by programmes which have been instituted by those departments in government concerned with economic development, labour legislation, and manpower training.

It is my hope that the results of this Conference will assist us in bringing the fruits of automation to the people of Ontario. The establishment of the Foundation on Automation and Employment, the production of the film which was based on the Conference and the publication of this book should be of assistance in meeting this goal.

A handwritten signature in dark ink, reading "John P. Robarts". The signature is fluid and cursive, with the first name "John" being the most prominent.

JOHN P. ROBARTS,
Prime Minister of Ontario.

INTRODUCTION

What is automation? To the worker it represents an impersonal mechanical device which threatens to deprive him of his livelihood; to management it represents a more efficient and competitive way of doing things; to government it means assuming responsibility to ameliorate hardship which may result, and to society generally it poses either a threat or a promise of abundance and leisure.

The Conference on Automation and Social Change was an attempt by the Government of Ontario to look at automation and the problems it creates from these different viewpoints and to provide information which could then be used by the Government as well as other bodies in developing programmes to meet these problems.

The Conference was held on September 17th, 18th and 19th, 1963 at the King Edward Hotel in Toronto. Its sponsors were the Ontario Departments of Labour, Education, Economics and Development and the Ontario Economic Council. In attendance were almost 500 delegates representative of business, labour, educational, governmental and professional organizations in the Province as well as from the Federal Government and other provincial governments in Canada. The speakers, whose addresses are reproduced in the following pages, came from Sweden, the United Kingdom and the United States as well as from various parts of Canada.

Each of the three days of the Conference concentrated on one of the major impacts of automation and technological change. The first morning's program set the economic, technical and social framework on which the more specific addresses and panels were based. The afternoon of the first day focused the attention of the Conference on the economic impact of technological change in Canada through a panel discussion which featured representatives of management, labour and universities.

The theme of the second day was the impact of technological change on labour-management relations. In the morning an international speaker outlined the general topic and a Canadian labour-management panel discussed developments in this country. The

luncheon speaker described the methods by which Sweden attempts to provide full employment and job security and in the afternoon representatives of Canadian management and labour discussed the respective roles of these two areas of the economy in meeting the impact of technological change.

At a special dinner held in the Royal York Hotel on September 18th at which some 1,300 were present, keynote speeches were given by the Co-Chairmen of the American Foundation on Automation and Employment.

The morning of the final day was devoted to the role of educational institutions in developing the manpower skills required by the new technology. Speakers described the present vocational and technical training programmes of the Federal and Provincial governments and what should be done in the future by secondary schools and institutes of higher education.

The Conference was concluded after luncheon on September 19th by an address which summarized some of the main problem areas brought out by the Conference proceedings and which contained a moving description of the challenges which must be met by our society if automation is not to disrupt our most cherished values.

Much of the value of any Conference is obtained from the give and take of a panel discussion and the informal contacts among delegates. This book does not attempt to capture the spirit which was engendered at the Conference — the sense of immediacy of the problems created by automation and technological change — or the fruitful dialogue which took place in discussion following the addresses by panel members. The panels were lively with both the international keynote speakers as well as the actual members participating in the handling of questions from the audience.

In conjunction with the Conference a television film was prepared under the sponsorship of the three departments involved and the Metropolitan Education Television Association. The film included panel discussions featuring the main speakers of the Conference itself along with a studio audience composed partly of Conference delegates. The filming took place at the studios of the Ryerson Polytechnical Institute to which special buses took Conference delegates at the conclusion of the regular Conference sessions. This film was prepared for showing on television stations in many centres of Canada

and will be used for educational purposes by the three departments of government and the Economic Council.

To ensure that the value of the Conference be not lost, the Ontario Minister of Labour, in concluding the sessions, announced the establishment of a steering committee under the aegis of the Ontario Economic Council to recommend the organization and terms of reference of an Ontario Foundation on Automation and Employment.

TABLE OF CONTENTS

	Page No.
Foreword	3
Introduction	4
Introductory Remarks	
Hon. Robert W. Macaulay	9
Hon. William G. Davis	13
Automation—The Economic Perspective	
Ewan Clague	17
Technical Developments in Automation, Present and Potential	
O. M. Solandt	33
The Impact of Automation on Society	
Sir Geoffrey Vickers	41
Automation, Economic Growth and Unemployment in Canada	
W. D. Wood	55
D. G. Willmot	62
Kenneth J. Brown	72
Impact of Technological Change on Labour-Management Relations	
John T. Dunlop	83
The Impact of Automation on Labour-Management Relations in Canada	
P. M. Draper	96
David Archer	109
The Manpower Adjustment Program in Sweden	
Nils Kellgren	116

	Page No.
Technological Change and the Adjustment of the Work Force in Canada	
H. L. Shepherd	129
Russell Harvey	139
Industry's Human Responsibilities in the Age of Automation	
John I. Snyder, Jr.	150
The Challenge of Automation	
Albert J. Hayes	160
Government Legislation and Manpower Training	
C. R. Ford	168
L. M. Johnston	180
H. S. Braun	185
Arthur Porter	194
The Outlook for Society	
C. E. Hendry	203
Concluding Remarks	
Hon. H. L. Rowntree	221
Appendix	
Delegates Attending the Conference	225
Photographs taken at the Conference—following page	128

INTRODUCTORY REMARKS

by HON. ROBERT W. MACAULAY

MINISTER OF ECONOMICS AND DEVELOPMENT

It gives me a great deal of pleasure to participate in the opening of this Conference on Automation and Social Change. We have with us some of the leading authorities on this subject from Europe, from the United States and from our own country.



We are confident that the group drawn together here at this time will be able to throw new light on the problems facing all of us in meeting the challenges of this new technological age.

The problems of adjustment to the changes in technology are manifold and cannot even be raised by any one group in the community, let alone answered by one group. For this reason we have brought you together—leaders of industry, labour, governments and education to hear the views of our learned guests and to hear your thoughts and ideas on these problems. We must ensure that our people and our industries obtain the greatest possible benefits from

new technological developments and at the same time we must minimize the adjustments which will be required in bringing about the changes in our productive techniques. I hope and trust that all of you who are here will give us the benefit of your consideration of these problems.

The subject matter of this conference, Automation and Social Change, is one of vast scope. We cannot hope to cover all aspects of automation and its effect on social and human relationships in

three days. We do expect, however, that the factors which influence our total decisions will be more clearly defined and that we will together be able to clarify the questions which we must ask ourselves about the effects of automation on our workers and on our training requirements.

A great deal has been said about automation—both its technical aspects and its social effects—but there has not been any general agreement on the significance of automation. It can be a great boon to humanity in freeing us from a great deal of drudgery and can greatly increase our standards of living if we adjust our economic and political environment to the changing technology. Many workers fear that increasing automation will result in increased unemployment. Even if all our material and aesthetic wants were satiated we would still gain an advantage in improving our production and distribution techniques by increasing our leisure. This in itself has advantages, but we do not need to be concerned yet with a lack of need for material wealth and certainly not for social capital. Even in the North American affluent society there are many creature comforts which we so far cannot afford. We are just in the process of expanding our health and welfare services to ensure that those people outside the work force share equally the benefits of our increased economic wealth. In this city, air conditioning through the entire urban area is still far out of sight in terms of cost but no one would say that roasting in July and freezing in January and February are the most pleasant experiences. There are many such things which would make life easier and more pleasant for all of us, so that there is still little fear of a satiation of all our wants. If automation brings these things within the realm of possibility we cannot dismiss it as too disrupting and therefore a bad thing. We must advance our knowledge of the economic and social environment to keep pace with the growth in scientific and technological knowledge.

Some of the changes taking place in our economy as a result of new technology are revolutionary in effect. They are affecting both our production processes and the social and economic lives of our people. They have brought forth a demand for people with entirely new combinations of skills and knowledge. They have made certain combinations of skills almost obsolete. To the economist it is of the utmost importance that people with the necessary skills

are available to take advantage of opportunities for industrial expansion and that all workers be able to obtain productive jobs which will add to the national wealth. In other words that the right people with the right training are in the right places at the right time.

All of us here at the conference are aware of the importance of making the best possible adjustments to the changing economic environment. Industry must be able to obtain or be prepared to train workers to fill the changing jobs. Labour must look out for the best interests of the worker and must help the worker to become sufficiently mobile and flexible to take advantage of the opportunities arising from the shifts in employment. Government and educational authorities have to assist both these groups in research into the direction and scope of future changes and we must provide the young with adequate basic training to fit them for this new world and to re-train workers whose jobs have become redundant. We hope that this conference will help us to direct our activities and our research in the direction which will be most fruitful for all of us. We feel that the continued interest and contribution of both industry and labour to the study of this field of activity is essential to the solution of these problems.

The problems raised by economic changes brought in by the introduction of automation and other technological changes are of particular importance to us at the present time because of the large number of young people just approaching working age. In this province, in 1962, there were 463,000 young people 15-19 years of age. By 1971 we can expect to have about 672,000 persons in this age group even if we have no net immigration to the Province. If migration rates came up to long-term average we would have close to 700,000 young people 15-19 by 1970. This means that in 8 years there will be 45 per cent more young people of secondary school and school-leaving age than there are now. This rapid increase which we are now looking forward to has necessitated a completely new look at our educational and training facilities. From 1931 to 1956 the Ontario population aged 15 to 19 inclusive fluctuated within a range of 310,000 to 350,000, which meant that our educational and training facilities did not have to undergo much expansion for a long period of time. We had to be concerned with the quality and type of education and training we were giving

our young people but not to the same extent with the numbers coming in for training. Now we are having to expand facilities and training programmes at the same time as our economy is undergoing tremendous technological developments which are changing the nature of labour requirements. We have to weigh the possible effects of both of these factors on the labour market and provide the best training possible as well as ensure that our young people will have the greatest possible opportunity to use their brains and to make the most of their opportunities.

The Department of Economics and Development has a very strong interest in automation and social change. We are concerned with the means of attaining a steady high rate of economic growth in this province, and that the people benefit from that growth. Almost all facets of our social environment and work environment are related to our economic well-being and so are of concern to us in at least some of their aspects. Automation, because it provides a tool for greatly increasing the level of the provincial product, cannot be ignored. We want to know how it is affecting our economy now. We want to know what it is likely to do for us in the future. We want to be sure that our industrial leaders are aware of the new technological developments and are applying them wherever they are applicable. This we must do if we are to maintain our place in competitive world markets.

We also wish to ensure that the labour saved through automation and social change is directed into productive channels. There must be a balancing in our economy between disemployment of labour through technological change and the demand for labour to fill additional wants. My colleagues, Mr. Rowntree and Mr. Davis, have an even more active interest in the adjustment of the workers to these changes, but from a strictly economic point of view we also are vitally interested.

I do not believe that the solution to automation lies in legislation, nor do I believe that governments can or should accept the responsibility for finding the solution—the solution will only be found through the sound, mature cooperation of every segment of our economy but particularly in the fields of the labour movement and of industrial management.

A free society must not surrender itself to governments—for governments have in history rather effectively proven that what they can give, they can also take away.

This Conference assembles some of the foremost brains in the world in one place to make an historic beginning in Canada to tackle in a sensible way automation and social change.

Are we to be or not to be—that is the question.

INTRODUCTORY REMARKS

by HON. WILLIAM G. DAVIS

MINISTER OF EDUCATION

New developments in business and industry affect us all directly or indirectly. They require adjustments in the production and processing of food, the supply and use of our natural resources, and the relationship of our nation to other lands both near and far. In fact, the present period of adjustment has been called by some the Social Revolution of the Sixties because it is clear that changes now in progress will have a substantial influence in this decade upon the daily life and habits of every Canadian. None of us would imply that automation and social change began only in 1960 or that their main effects will pass by 1970. But, this revolution crept upon us so imperceptibly in the 'fifties that we were unaware of the acceleration which it was about to acquire and the momentum which it plainly will gather in the years just ahead.



In this conference, as I view it, the purpose is to study the effect of automation on society and to consider steps that might be taken by business, industry, and government for the good of that society in Ontario, and our sister provinces.

In my brief remarks this morning I shall attempt to provide an educational backdrop for the stage of the conference.

The first adverse symptom of automation has been unemployment. It has early become apparent that the demand for skilled persons exceeds the supply and that the supply of unskilled labour and of persons with a minimum of education exceeds the demand. In dealing with the problems presented by this situation, our province has accepted the support provided by the Technical and Vocational Training Agreement with the Government of Canada and has established, under Programme 5, educational classes for the unemployed in most of the cities. In the past year under this programme, the product of the number of persons trained and the number of training days exceeded 600,000. In the current year this total will rise even higher. The Programme is fully organized under the direction of Mayors' Committees and under the supervision of the Department of Education.

Unemployment training classes are intended for adults who have been out of school for some time. To prevent pupils currently in school from needing similar retraining in adult life, steps have been taken to induce our young people to stay at high school until they graduate from one of a wide variety of courses that have been established there to meet their needs. I believe that the public is now acutely aware of the importance of having our young people adequately educated or trained before they enter the labour market.

In the past two years the Governments of Canada and Ontario have provided secondary school buildings or additions for vocational purposes to the extent of \$265 million, without direct taxation upon local ratepayers. Many of these schools are entirely new; others are vocational additions to existing high schools or colleges. This month most of this new accommodation is completed and in use. Hitherto, only the larger cities provided vocational education. It is now available for the first time in the schools of our larger towns, and accessible through bus transportation to the rural areas surrounding them.

Simultaneously with the erection of new vocational accommodation, a reorganized programme of studies has been introduced into the secondary schools. This September, the pupils of Grades 9 and 10 in most areas are able to choose a course from one of three

branches: Arts and Science; Business and Commerce; or Science, Technology and Trades. In each of these, a Five-Year Programme leading to higher education and a Four-Year Programme leading to employment are offered. For the pupils less talented in academic subjects, a One or Two-Year Occupational Trades Programme is provided. The increase in the enrolments of our secondary schools permits them to offer this wide variety of opportunities for pupils, a variety which would not have been economically possible ten years ago.

In the sphere of tertiary or post-secondary education, challenging problems confront us. By tertiary education I mean not only university training but any training provided for graduates of a secondary school in other institutions of further education such as teachers' colleges, schools of nursing, and institutes of technology. In all of these fields, rising enrolments, the provision of new buildings, and the recruitment and training of staff are the order of the day. Some people view such expansion with alarm, and I can say very frankly that the amount of money it requires is so great that it gives us reason to pause and consider priorities in our economy. But it would be much more alarming if there were not this demand for post-secondary education. I can assure you that this province is devoting its best thought and a substantial part of its revenue to the end that necessary facilities for education at the tertiary level may be made available.

Canada has a relatively low proportion of professional people in comparison with other western nations. Our need of doctors, dentists, teachers, technologists, technicians does not require elaboration here. We must educate all worthy applicants. Yet these institutions by their highly specialized nature can be established only in a few of the larger cities. Our students, at least half of them, must live away from home, with resultant increase in living costs. To the financial assistance already given to post-secondary institutions of learning through capital and maintenance grants and through the provision of such provincially operated institutions as teachers' colleges, institutes of technology and institutes of trades, it has been necessary to establish a provincial student-aid programme of scholarships, bursaries and loans, a programme that last year distributed some \$4 million in 11,000 awards to promising students.

I have touched upon the educational implications of the social changes occurring around us, with special reference to training the unemployed, providing secondary school courses designed to serve students of differing abilities and aptitudes, and assuring not only that staff and accommodations are available for post-secondary education but that aid be given to enable needy students to take advantage of such facilities. Before closing, I would add that during this conference much consideration will be given to the possibility of the retraining of employed persons by providing them with the academic background to absorb the knowledge and skills necessary for the operation of new automatic equipment in their own plants.

It has been said that all men have three jobs. The most obvious one is to earn a living, so education must train us for employment. Secondly, we are all citizens, members of a state, and we have to learn to live in one. The last task of education is the making of human beings, that is the development in each individual, as far as they can be developed, of body, mind, and character.

In our study and discussion at this Conference on Automation and Social Change, I am hopeful that we shall keep these three aims in view. For soundly planned education for our youth—and in many cases for adults as well—is vital not only to our present economic and social needs but to our future.

AUTOMATION — THE ECONOMIC PERSPECTIVE

by EWAN CLAGUE

Dr. Clague is commissioner of labour statistics with the U.S. Department of Labor where he directs studies on manpower and employment, wages and industrial relations, productivity and technological developments and other matters. A former director of research and statistics on the Social Security Board, he also taught at several American universities, including the Pennsylvania School of Social Work, an affiliate of the University of Pennsylvania.



The word "automation" was coined some 20 years ago to describe the highly specialized types of self-regulating mechanisms which were then just beginning to make their appearance in industry. The term "cybernetics" was coined at about the same time. The subsequent history of these two words constitutes an excellent example of the behavior of language under the impact of popularization. Cybernetics, protected by its classical Greek derivation, has retained its original precise meaning among scholars and technicians, untouched by popular distortion. Automation, on the other hand, has entered the vocabulary of the man in the street. The reason is simple: automation seems like a member of a familiar group of words — automat, automatic, automotive, automobile, etc. Everyone knows these words.

So automation has drifted far from its original moorings and it has become badly battered in the process. It is still sometimes used in its highly technical sense, but its meaning has been widened to include all kinds of and varieties of mechanization. It has even been extended to include changes in work methods or materials, and at times it is treated as the equivalent of changes in productivity — that is, productivity defined as changes in output per man-hour of labor input.

There is nothing we can do about this tendency of words to acquire new meanings as they grow older. I think it was Ogden and Richards who described the word “beauty” as having 16 different meanings; and I am sure that the word “love” must literally have scores of meanings. But this doesn’t prevent people from using these two words every day; although there is abundant evidence that they don’t always result in successful communication.

For purposes of meaningful discussion, it is necessary for a speaker to prescribe some limits to the meaning of words. I want to emphasize at the outset that I shall use the word “automation” in a broader sense than its original technical meaning. I include within it all kinds of technological changes, even though some of these are simply mechanization in its old forms. On the other hand, I do not regard automation as the equivalent of productivity. There are a number of ways in which the output per man-hour of labor can be changed without any mechanization at all. An obvious example is a change in work methods which increases the worker’s output without any change in the equipment with which he works. On the opposite side of this middle-of-the-road definition is the continued use of automation in its narrow sense. I heard an industrialist say “Our industry can’t be automated.” He means automation in its original technical sense; but that is not the way I am using it. I shall use automation as the equivalent of mechanization in general, the substitution of equipment for labor.

You have asked me to discuss the economic perspectives of automation in this broader sense. This title further widens the subject matter. It involves not only the relationship of technology to labor in the workshop or in collective bargaining between management and labor; it also involves government policies, representing the public reactions to change and to the problems that change is creating. Since your Conference provides for many sessions on the more concrete

problems of technological change, I shall select for my attention those broader economic aspects which reflect the interests of the public, of the whole population.

Productivity

First, let us take the most obvious economic relationship, namely, between automation and productivity. Why has automation attracted so much attention during the last few years? Is it expanding at lightning speed? Is it causing the rate of productivity gains to speed up?

Broadly speaking, the answer is, No. Chart 1 shows indexes of output per man-hour in the United States private economy for the past 15 years. We omit government production and employment from these calculations for reasons which need not concern us here. However, you may be interested to know that the U.S. Bureau of the Budget is conducting an experimental project, in cooperation with selected Federal Government agencies, to determine how and to what extent government activities can be measured in productivity terms. If the project is successful we may be able in the future to include government in our productivity measurements for the economy as a whole.

The chart shows that, while there are variations from year to year, there is no indication that the rate of productivity increases has been stepped up in recent years. There certainly has been a remarkable improvement in agriculture, which has averaged about twice the increase in the remaining sectors of the economy. But the rate in agriculture has been no higher in the last five or six years than it was in the first decade after World War II.

There is one caution which I must express concerning this chart; it may give the impression that productivity in agriculture is actually at a higher level today than productivity in other sectors of the economy, such as manufacturing. However, this is not the case. The chart simply shows the rate of change since 1947. At that time, the output of a man on the farm was far below that of a man in industry. During the past 15 years agriculture has certainly been catching up, but the actual level is still below manufacturing, which mechanized long ago, particularly during the 1920's. Our projections for agriculture indicate that these sharp increases in productivity are likely to continue during the 1960's. It is possible that some day agricultural

efficiency in the use of labor may progress to a point where it would be on a level with industry generally.

Real Incomes

Secondly, I want to call your attention to one of the positive achievements of automation, namely, its contribution to higher incomes and better living conditions for people generally. Chart 2 shows for the past quarter of a century the average earnings, both weekly and hourly, of production (plant) workers in manufacturing industries in the United States as compared to the rise in our Consumer Price Index, representing the cost of living. Money wages have multiplied more than four times, while the price index has risen only a little more than half that much. The difference represents approximately the influence of productivity gains.

I generally find it necessary to point out that our Consumer Price Index does not include income taxes and certain other direct taxes. All sales taxes, which are attached to the commodity or service when it is bought by the consumer, are included in the index. We include home ownership in our housing items, and so the index contains the local taxes on owned homes. Thus a significant part of the taxes paid by Americans are represented in our cost-of-living figures, even though income taxes are not. However, in order to take such direct taxes into account in measuring living standards, we publish every month another set of statistics, which shows the earnings of the workers adjusted *both* for the rise in the Consumer Price Index and for the rise in taxes. I say "rise" in taxes, not because tax rates have gone up in recent years, but because higher incomes result in a larger amount of tax. Our statistics show that the production worker in manufacturing with three dependents has achieved a net gain in the purchasing power of his weekly earnings of about one-third since 1947.

In summary, this rise in real incomes is the direct consequence of gains in productivity, which in turn are derived in large measure from automation.

Employment and Unemployment

I now return to the first question I asked. If there is no evidence that technology has speeded up the rate of productivity of the whole economy, and if the results of technological change have been clearly

expressed in rising real wages and better living conditions, then why has automation attracted so much attention and become such a problem? I suggest three possible answers: (a) the impact of the new technology is not spread evenly over the whole economy, but hits with special force in certain sectors; (b) at the same time it exerts an across-the-board influence on educational and skill requirements which limits the re-employment opportunities of some groups of unemployed; (c) automation is now operating in an economic climate which aggravates its labor displacement effects. It is the combined influence of these three factors which is largely responsible for the impact of automation upon labor-management relations (see following section on this subject).

In the United States during the past decade we have experienced some marked shifts in employment from the industries producing goods to those producing services. Charts 3 and 4 outline graphically the nature and extent of those employment shifts. Chart 3 shows employment over the past 10 years in agriculture and in the manufacturing, mining, and construction industries. Over the period of a decade this combination of industries has experienced a loss in employment of 2 million jobs. Contract construction is the only one of the group which has increased its employment over the level of 10 years ago; the others have all lost ground.

Chart 4 shows the industry groups in which employment has increased. In wholesale and retail trade the gain has been more than one and one-half million jobs; the large group of finance and service industries has increased its employment by about 3 million jobs; and state and local governments, also close to 3 million jobs. These are the industries which service our expanding population and its increasing urbanization.

The significance of this great employment shift is in its effect upon the nature of our unemployment problem in the United States. Millions of new jobs have been created in the past 10 years, but these are of a different character than the jobs which have been lost. The shift is away from blue-collar jobs and toward white-collar occupations. The latter, in general, require education and experience not ordinarily possessed by blue-collar workers. For example, within manufacturing industries since 1953 there has been a shrinkage of about one and one-half million production-worker jobs in the factories, partly offset by a rise of nearly a million white-collar jobs in the

offices. Relatively few of the blue-collar workers succeed in making that transfer. Furthermore, even within the blue-collar field the effect of automation has been to cut down on the unskilled and semi-skilled jobs. There are growing opportunities for young workers with higher levels of education and shrinking opportunities for the semi-literate members of the labor force. The problem is clearly highlighted by some statistics from our Monthly Report on the Labor Force. In the first quarter of 1962, when the over-all unemployment rate (not adjusted for seasonality) was 6.5 per cent, we made a special study of the educational attainments of the unemployed and found the following rates of unemployment: college graduates, 1.4 per cent; high school graduates, 5.1 per cent; 8 years of schooling, 7.2 per cent; and less than 5 years of schooling, 9.7. per cent. Lack of education is a barrier to re-employment.

Of course, the entire unemployment problem cannot be laid at the door of automation. We in the Bureau of Labor Statistics are often asked how much unemployment is due to automation. There is no precise quantitative answer to that question. The reasons why a worker lost his job are often uncertain and obscure — he may not know, and perhaps neither does his employer. Furthermore, if he remains unemployed for very long, a new question arises. Why can't he get a job, when there are thousands of jobs opening up every month? There is no satisfactory way of identifying the major cause of the unemployment of individual workers.

However, it is sometimes possible to analyze the broad dimensions of the problem. In both the United States and Canada unemployment has a large seasonal dimension. We have peak employment in the summer and low employment in midwinter. Some of these fluctuations in employment every year are met by entrances into and withdrawals from the labor force, but there is a residue which expresses itself in unemployment. In a special paper prepared for the Joint Economic Committee of the U.S. Congress — "Unemployment: Terminology, Measurement and Analysis" — the staff of the Bureau of Labor Statistics estimated that in 1960 a little over 20 per cent of average unemployment during the year might be attributed to seasonal factors. In addition, we have devised a method of seasonal adjustment which enables us to convert the actual rate of unemployment each month to a seasonally adjusted rate. In June 1963, the actual rate was 6.4 per cent, but when seasonally adjusted it came down to 5.7.

The latter rate eliminates the seasonal factors and concentrates attention on the business cycle and on economic growth, with automation in the background.

The next step is to determine, insofar as we can, the relative importance of these other factors. The most obvious of these is recession unemployment due to a downturn in business. A crude measure of the effect of recessions is the difference between the unemployment rate (seasonally adjusted) at the peak of prosperity and the rate at the bottom of the recession. From October 1957 (three months after the business peak in that year) until August 1963, the lowest seasonally adjusted rate of unemployment was about 5 per cent and the highest about $7\frac{1}{2}$ per cent. At the bottom of the last recession in 1961 the highest rate was 7 per cent, while in the present business recovery the best we have been able to do so far is to get down to $5\frac{1}{2}$ per cent. So, at the maximum, we could say that recent business recessions have produced an additional 2 per cent rate of unemployment.

To get at the influence of automation, in the sense of technological change in all its forms, is more difficult. Allowances must be made for still other causes. Some of our unemployment in this month of September 1963 is due to changes in consumer demand, movement of plants to new locations, business failures, etc. Nor should we overlook the free enterprise activities of the members of the labor force — in a free labor market, workers often quit their jobs to seek better ones, and may experience some unemployment in the process. Furthermore, a substantial proportion of the unemployed are out of work for only short periods of time. For the first 8 months of 1963, nearly 45 per cent of the unemployed had been out of work less than 5 weeks—about a month or less. In 1953, on the average for the first 9 months of that year, nearly three-fifths of the unemployed were out of work less than 5 weeks, and only 5 per cent — one in every 20 unemployed — was out of work more than 26 weeks, which is the usual duration of unemployment insurance. Even when the unemployment experience of workers is cumulated for a whole year, this same fact emerges. A special study was made of the work experience of the labor force in 1961 (Special Labor Force Report No. 25). About 80 million persons held a job at some time during the year, of whom over 13 million experienced some unemployment. Almost one-third of those unemployed were out of work less than 5 weeks.

This short-term unemployment might be called "turnover" unemployment. It will exist in any dynamic and progressive economy. In the United States in the postwar period, about the lowest annual unemployment rate we have been able to achieve was slightly under 3 per cent.

This short-term unemployment is *not* the place to look for the impact of automation. Technology is more likely to express itself in the elimination of jobs, skills and occupations, and therefore in more prolonged unemployment. On the average during 1953, 80,000 workers were unemployed more than 26 weeks. In July 1963 it was over half a million. Of course, not all these long-term unemployed could be attributed to automation; but considerable numbers of them may be experiencing its consequences.

In 1962, at a conference on Automation and Technological Change conducted by the American Assembly at Arden House, Leon Greenberg and I attempted to discern some of the dimensions of the automation factor. I shall not take the time to summarize the study, copies of which are available to anyone who is interested. (See *Automation and Technological Change*, The American Assembly, Columbia University, published by Prentice-Hall, Inc., 1962; also, *Technological Change and Employment*, *Monthly Labor Review*, July 1962; Reprint No. 2398.) But I can describe it briefly.

We first selected two pairs of years of high-level employment — 1947 and 1957; 1953 and 1959. This was to avoid the effect of business recessions upon the figures. For the 1947-1957 comparison we were able to calculate factory-worker employment and productivity for over 300 different manufacturing industries; for the 1953-1959 comparison we used total employment and productivity figures for about 200 such industries. In both cases, we divided the industries into two broad groups: (1) those in which employment had increased over the period and was higher in the later year; and (2) those in which employment had decreased and was lower in the later year.

Since the first group of industries was employing more workers (factory workers in one case, all employees in the other) in the later year, regardless of automation and improved technology, there was no *net* technological displacement in these industries. Among the industries which experienced declines in employment it was necessary to make a distinction between losses in jobs due to automation and losses

due to declines in output. For example, there were a few industries in each case in which productivity actually declined; for such industries it is clear that the loss of jobs was due to declines in production and not to automation. In a much larger number of these industries output had increased over the period so that any loss in jobs was solely due to automation. Finally, there was the third class of industries in this group in which both declines in output and improved technology played a part in the job loss; for these, we estimated the net effect of each factor.

The results of our calculations for the period 1947-1957 were somewhat different from those for 1953-1959. This difference was closely related to the fact that production worker employment in manufacturing had *increased* by three quarters of a million from 1947 to 1957, while such employment *decreased* by nearly one and one-half million between 1953 and 1959. Nevertheless, our results for 1947-1957 showed a loss of employment for all manufacturing industries of over 880,000 production workers related to increased productivity, an average of nearly 90,000 workers a year. For the 6-year period, 1953-1959, the loss in total employment in all manufacturing related to productivity gains was over a million workers. On the average, this amounted to nearly 200,000 workers a year.

A few words of caution are necessary at this point. In one sense the above estimates exaggerate the labor displacement attributable to automation, since the figures are based on all kinds of productivity gains. Technological change was undoubtedly a major factor in those gains, but it was not the only factor. However, in another sense, the above estimates are too low to measure fully the effect of automation in the manufacturing sector. In our calculations we treated each industry as a whole; whereas it is obvious that there could be substantial losses of certain jobs, skills and occupations in some plants within an industry, offset by increases in other kinds of jobs. A case in point is the example cited earlier of manufacturing employment from 1953 to 1963 — a loss of $1\frac{1}{2}$ million factory jobs partially offset by a rise of nearly a million office jobs. The full impact of technological change in manufacturing may not be measured by the *net* loss of $1\frac{1}{2}$ million jobs in those 10 years. Such intra-industry shifts in jobs are one reason why groups of workers may be complaining about the effects of automation on jobs at times when employment in an industry as a whole is increasing. Of course, the strongest com-

plaints come from workers employed in industries which are experiencing net declines in employment because then an even greater job adjustment has to be made.

Labour-management Relations

This selective impact of automation upon particular industries and occupations has had a marked effect upon labor-management relations in the United States. For the first 10 years after World War II the demands of the unions in collective bargaining were centered primarily on higher wages, supplemented at times by higher fringe benefits — pensions, life insurance, health and welfare plans, etc. Within the past five or six years the emphasis has changed. Unions are now devoting more attention to providing protection for those union members who are already unemployed or for those who might become unemployed in the future. Job protection and employment security have become much more important to union members.

Automation is not solely responsible for this new aspect of collective bargaining. Equally important is the changed economic climate of the past five or six years. From the end of World War II up to 1957 there were periodic increases in prices, both business prices, as represented by the Wholesale Price Index, and retail prices, as represented by the Consumer Price Index. At times these price rises came to a halt, but eventually another rise would begin. Collective bargaining took place in an expanding economy, which was making up for war-time shortages, and in a climate of rising prices.

But during the past five years there has been almost complete stability of business and consumer price levels. There is no need to emphasize this to an audience of Canadians. Your indexes of prices have behaved almost exactly like ours. Our Wholesale Price Index is no higher today than it was five years ago in 1958. Our Consumer Price Index has risen over this same period at slightly more than one per cent a year, but an important factor in this rise has been the slow but persistent increase in the prices of services, as contrasted with food and other commodities. For the great majority of business enterprises, we are in a period of continuing price stability. Individual prices have fluctuated up and down; but price increases are difficult to establish and maintain in the face of ample capacity.

Under these circumstances, managements in recent years have begun to resist wage increases. They have been unable to count upon

price increases to absorb rising labor costs — or rising other costs, for that matter. The effect has been to slow down somewhat the rate of wage increases in collective agreements, particularly increases in the form of direct cash wages.

On the other hand, there has been no spectacular increase in strike activity. In fact, the year 1963 (through July) thus far shows the lowest number of workers involved in strikes beginning in that period since World War II. With many unions experiencing substantial amounts of unemployment among their members, there has been less incentive to strike. What has occurred is an increase in “hard” bargaining, with union emphasis on job protection and management pressure for changes in work practices in order to reduce labor costs.

The results of this recent bargaining have been expressed in a variety of different ways in different industries and in different bargaining situations. One of the first agreements reached under these economic conditions was that signed by the employers and the union on the Pacific Coast in longshoring. The employers agreed to set aside a sum each year of first \$1.5 million, then increased to \$5 million, for the purpose of providing full-time pay each week for longshoremen at work and encouraging early retirement. The union, in turn, agreed to permit introduction of labor-saving devices and substantial modification of work practices in loading and unloading vessels.

Another example was the Armour Meat Packing Company, which negotiated with two unions. A fund of \$500,000 was set aside by the company to assist workers displaced in a modernization program, which resulted in the closing of a number of obsolete plants throughout the country.

In the steel industry, as an aftermath of the long strike in 1959, Steelworkers' 1960 contract established a Human Relations Research Committee charged with making studies and recommending solutions to mutual problems in such fields as wage adjustments and other problems the parties decided to refer to it. The Committee, which was continued by the 1962 contract, had become so well established by 1963, that, in effect, contract bargaining in that year took place within the Committee and a settlement was reached before the formal reopening of the contract in mid-1963. While the economic situation in basic steel in 1963 was not conducive to a strike, it can certainly be argued that discussion of major issues by the Committee prior to formal bargaining helped toward a peaceful settlement.

Late in 1959, one steel company (Kaiser) had established a separate committee, entitled "The Long Range Committee". This Committee, early in 1963, worked out the "Long-Range Sharing Plan," which was designed, to some extent, as a substitute for periodic collective bargaining to divide the fruits of progress between labor and management. Under this new plan, workers are to receive approximately one-third of savings in materials and savings resulting from increased labor output, and there are guarantees against reductions in income or employment as a result of technological change.

Negotiations to solve problems of change have not always been successful. The recent difficulties on the railroads are an evidence of this. Some years ago, Canada arrived at a solution of some of the issues still unresolved in our country, where collective bargaining was unable to solve the impasse which existed between management and labor on the issue of work practices. The Congress had to pass emergency legislation in order to ward off a transportation crisis.

In another case, the government found it necessary to take forceful action in pressing for a settlement. That was in longshoring in East Coast and Gulf ports after a 39-day strike, when a specially convened board, headed by Senator Wayne Morse of Oregon, supplied a decision which labor and management were urged to accept. However, this solution was a temporary one. The real issue of work practices versus job protection was postponed for a year while the U.S. Department of Labor is conducting a three-ply survey — of labor utilization on the waterfront, of job security plans which might be applicable in longshoring, and of all other related issues. The results of this survey are to be available to the parties for the next collective bargaining which will take place in the summer of 1964. The purpose of the survey is not to decide the issues, but to furnish the parties with the facts.

As time goes on, other companies and unions will undoubtedly work out other plans to provide job security, plans adjusted to conditions in their respective industries. In some cases, the unions have asked for reductions in the weekly hours of work on the ground that shorter hours will open up more jobs for unemployed members. There has been a long-time trend in American industry towards shorter hours, although the rate of decline slowed down after the 40-hour week was adopted some 20 years ago. A union demand for shorter hours is usually tied to a demand for the same weekly pay as before, entirely apart from any wage increase which may be obtained. Such a

program has to proceed gradually and slowly. Any sharp reduction in weekly hours — to 37½, 36 or 35 hours per week — would raise labor costs substantially and could have the effect of reducing employment rather than increasing it.

Other unions, particularly those in the continuous-process industries, have hit upon another device for reducing hours and opening up some jobs for their unemployed members. In 1962, the United Steelworkers negotiated a contract with half a dozen can companies which provided for a 3-month vacation with pay every 5 years for workers with 15 years' seniority. This type of contract was then extended to the much larger steel industry, but in this case the agreement provided that the half of the workers in each company with the highest seniority would be entitled to paid vacations of 3 months every 5 years. In general, the seniority required for this purpose ranged from 12 years in some companies to 17 in others.

Still another proposal which has been advanced by some unions is to increase the rate of overtime premium pay from one and one-half times the regular hourly rate to twice the regular rate. The statistics of weekly hours in some industries during 1962-1963 show that employers (and perhaps the workers also) prefer to employ existing personnel at overtime pay, rather than to hire additional workers to meet their needs for increased output. The unions argue that raising the rate of premium pay would make overtime still more costly and, therefore, encourage the hiring of additional unemployed workers.

Government Policies

The changed climate of collective bargaining has already produced a series of government policies and legislation on the subject of labor-management relations. From a broad economic point of view, the government has long been concerned with preventing a wage-price spiral leading to inflation. For many years the Council of Economic Advisors has advocated restraint in collective bargaining. In 1962, the Council issued a set of guideposts based on the general economic principle that wage increases should be kept within reasonable limits of the average rise in productivity of the economy as a whole. The Council recognized that there would be special cases, such as the need to match wage rates in comparable occupations in other industries, or wage increases sufficient to attract a supply of labor in scarce occupations. But the main point stressed by the Council was that, unless

wage increases are kept approximately in balance with productivity gains, labor costs will increase and prices will rise. In actual fact, wage and salary increases in the United States economy as a whole have not been significantly greater than the productivity gains during the past five years. This is evidenced by the general stability of prices. In our country there has been nothing resembling the 10 per cent wage increases per year which have occurred recently in various European countries. Of course, there have been some groups of workers in the U.S. who have achieved increases higher than the average, but these have been balanced by others who have lagged behind.

It is of interest to note in this connection that many governments in Western Europe have also enunciated this same policy — holding wage increases down to the limits of productivity gains each year. These countries, which are recovering from wartime losses and destruction, have had considerably higher productivity gains than the United States and Canada. But the wage increases have exceeded even these higher gains, and so prices, both at wholesale and at retail, are rising fairly sharply in a number of Western European countries.

One consequence of this constant reference to productivity is to throw more responsibility on the nation's statistical agencies. Management, labor, and the general public have long been familiar with cost-of-living statistics, which have become basic data for collective bargaining as well as for national policy. Cost-of-living statistics have been supported, developed and improved in recent decades. They are reasonably well understood by the users. On the other hand, productivity statistics are not yet so well developed and they are not at all well understood.

We in the United States have probably done more work in this field than the statisticians in any other country. This is partly because we have developed much more comprehensive statistical reporting systems; but it is also due to the fact that our managements and unions were the first to use the productivity factor in collective bargaining. It was 15 years ago, in 1948, when the automobile companies and the Auto Workers Union negotiated for the first time the escalation type of wage contract in which wages were changed four times a year in response to changes in the Consumer Price Index and were raised once every year in accordance with an estimate of the average rise in the nation's standard of living (which, in turn, is determined by productivity improvements). At times during the past 15

years about one-fourth of the organized workers in our country have been covered by such contracts.

That number has decreased in recent years with the continued stability of the Consumer Price Index. However, we have experienced no decline and possibly some growth in the number of workers covered by provisions for annual deferred wage increases. The most recent estimate of the Bureau of Labor Statistics is that in 1963 about 3.3 million workers were covered by contracts providing deferred wage increases in future years (including some contracts providing cost-of-living escalators as well).

In the last few years the government policy announcing guideposts for collective bargaining based on the principle of negotiating wage increases in the light of annual productivity gains has put additional emphasis on the development of accurate productivity statistics. Speaking as a statistician whose agency is responsible for the compilation and the explanation of these statistics in our country, I can speak feelingly about two necessities: (1) the need to develop and improve the basic statistics of production, employment and productivity, if these are to be used in private bargaining and for public policy, and (2) the need for additional analytical research on the subject of productivity, so that there will be better public understanding of the possibilities and the limitations of such statistics.

In the United States, the government has also had to face the consequences of squeezing labor out of various industries through technological changes. The higher volume of unemployment in the United States, as well as in Canada, can be traced in part to the declining employment in a number of industries. I say "in part," because we have plenty of examples of expanding employment in other industries. However, the displaced workers, particularly those with limited education and skills, are not finding it easy to get jobs in the expanding industries. In fact, unemployment in our country is especially noticeable in two groups — the older workers who have relatively lower rates of unemployment because of their higher seniority, but who remain unemployed for a long time once they lose their jobs. The other acute problem is among the youth who find their job opportunities less plentiful than in the past decade. Our great cutback in agricultural employment has limited the job opportunities of many youngsters who used to work on the farms during the summer. In more permanent employment, young people without training or

experience are finding it difficult to get job opportunities in many nonfarm industries.

The government has tackled these problems in a number of ways. To deal with the problem of distressed areas — communities which are declining because industries have moved away — the Congress passed the Area Redevelopment Act designed to provide financial and other types of assistance to localities to enable them to attract new industries. To deal with the problem of structural unemployment on a broader basis, the Congress passed the Manpower Development and Training Act to provide short-term training or retraining for workers whose occupations are disappearing. This Act has been in operation for only about a year. The most recent figures indicate that approximately 63,000 workers are taking training at the present time. The objective of the government is to enlarge this program to cover at least 100,000 workers.

Throughout this discussion, I have treated unemployment as a structural problem in the American economy, i.e., a problem partially caused, and certainly aggravated, by personal and institutional rigidity. However, in closing, I must call attention to the fact that there is another viewpoint, namely that the present comparatively high levels of unemployment in periods of business prosperity are due largely to slow economic growth, which in turn can be attributed to lack of adequate demand. According to this theory, the public policy solution of the unemployment problem is to stimulate economic growth sufficiently to create additional employment. That theory points toward government action designed to increase demand and stimulate growth. Among the measures proposed for such a purpose is a substantial reduction in taxes, both on consumers and on business firms.

At times, these two viewpoints are presented as opposites, but in my judgment there is no need to choose between them. All economists recognize that an expansion in demand would increase production and create more jobs, which would then reduce unemployment. The question is whether this in itself would eliminate the unemployment problem without price increases. My own judgment is that we have built into our economy over the past 15 years some institutional rigidities and have developed in our labor force some personal limitations which require our nation to tackle these problems directly in trying to solve the problem of unemployment.

TECHNICAL DEVELOPMENTS IN AUTOMATION, PRESENT AND POTENTIAL

by DR. O. M. SOLANDT

Born in Winnipeg in 1909, Dr. Solandt is vice-president and director of de Havilland Aircraft of Canada, Limited, and Hawker-Siddeley Canada Limited. Educated at Toronto and Cambridge Universities, he holds honorary D.Sc's from five universities and has two gold medals for outstanding achievements in medical and other scientific research in Canada and in England. Dr. Solandt was the first chairman of the Defence Research Board of Canada.



In every discussion of the problems of automation there is an argument concerning the need or possibility of distinguishing between automation and mechanization. I believe that automation and mechanization probably represent a continuous spectrum of change. At one extreme are complex devices for taking over control of intricate processes in a way that can clearly be called automation, while at the other end of the spectrum are simple examples of mechanization such as the use of an electric hand drill instead of a brace and bit. Since the social and economic consequences of automation and mechanization are so closely intertwined, I don't believe that it is worth while spending much time in making a distinction.

It is obviously not possible in the time available even to attempt a comprehensive review of the technical developments in mechaniza-

tion and automation in the present and immediate future. Automation no longer affects a limited number of specialized industries. It is already being applied very widely throughout our whole complex society. The technical possibilities for automation have far outrun the existing applications. In general, automation is even now being limited by economic and social factors rather than by technical ones. Nonetheless I think it is fascinating to consider a few representative examples of the kinds of automatic systems which are now foreseeable. However, before doing this I would like to interject an idea which is very useful in understanding much modern technology and which is essential in considering complex applications of automation.

There was a time when an engineer who planned a factory or a manager who set up a new office thought of these merely as buildings, machines and people that had to be assembled to do a particular job. Now the modern engineer or manager will think of his factory or office as a complex system of men and machines which is designed to receive certain inputs of information and materials, process these in specified ways and produce well defined outputs. If he is a little bit of a visionary, he sees his own system as merely a sub-system of a larger system, which may include a whole industry, a whole nation, or even the social and economic structure of all nations. This habit of thinking of organizations of men and machines as systems is a tremendously useful and productive one. It is almost essential to understanding the processes of automation.

Most of us cannot think of a system in abstract terms; we have to visualize it and try to give it some physical reality. Often this can only be done by analogy. The electrical engineer will use electrical analogies; the hydraulic engineer may use hydraulic analogies, and so on. As a physiologist I tend to compare industrial and business systems with the elegant systems which have been designed into the human body. The human analogies are more widely understood because all of us have some familiarity with the functioning of the human body. For example, we can compare a management information system in a modern industry with the human nervous system. In the human we have a variety of sense organs which supply information to the spinal cord and the brain. This information is then processed at an appropriate level in the central nervous system. A decision of some kind is taken on the basis of the incoming information and instructions are sent to the muscles to take appropriate action. Just as in the manage-

ment system, decisions may be taken at various levels. If you put your hand on a hot stove, the action necessary to remove your hand from the stove is taken at lower management levels without involving the head office, whereas if you see a pretty girl passing, this information will be sent straight to the cerebral cortex for careful consideration in order to determine an appropriate course of action.

Returning now to automation, one of the most important things to emphasize at a conference such as this is that automation has now reached a stage of its evolution where it is affecting everyone. In the foreseeable future its effects on management may be just as revolutionary and far-reaching as its better known and more often discussed effects on labour. Many of the latest developments in automation are concerned with the management process and with related problems of information processing rather than with the basic processes of production.

The type of automation which will have the most obvious impact on management is the evolution of so-called management information systems. In the past, in most businesses and industries, even simple factual information on such things as production and sales has not always been instantly available in usable form as a basis for management decisions. More complex or less readily available information has often not been presented to management until it had ceased to be of much value in decision-making, and in a good many cases important information was never available. With the development of electronic measuring and input devices, better communications, the use of computers for switching and data processing, and better display methods, managers at all levels can now have available to them timely, well-processed and well-displayed information as a basis for decision. Such systems will not only make available the information for decisions, but will also transmit the results of decisions rapidly to those who have to act on them. Obviously such a management information system will also give early reports on the results of decisions and so complete the loop in the management control system.

Over the years these management information systems will have a profound effect on the techniques of management. One obvious effect will be to support some tendency towards centralization. It might be noted in passing that this is not necessarily the right way to use these new tools. They can equally well be used for highly decentralized control, but probably will not be so used. There will probably be a

need for fewer managers at the top, and they will have to be intelligent, well-trained and well-informed.

Management information systems of the kind I have described are only beginning to appear in industry. However, they are in a more advanced stage of development in military applications, particularly in the United States. The advent of large nuclear weapons has made it clear that all such weapons must be continuously and completely under the control of the Head of State. Since the detonation of one 50 megaton weapon might start World War III, the decision to use such a weapon cannot be left in the hands of a junior commander. Mr. Kennedy and Mr. Krushchev must have complete control at all times. Attempts to solve this problem have led to the evolution of complex, sophisticated command and control systems. These systems have vast memories in which can be stored all relevant information about global situations. Suitable computers are included in the systems to call out this information from the memories and from it to produce revised plans to meet all conceivable situations.

The military have for many years been far in advance of business in industry in the techniques for the display of important management information. I am sure that many of you have seen the large display boards which have been used in air defence command centres during and since the war to display all relevant facts concerning an air battle to the commander. The use of these and even more sophisticated display systems will undoubtedly become an essential element in industrial management information systems in the future. There is no use having a vast mass of timely and well-processed information available if it cannot be fed into the mind of the decision-maker quickly and easily. This is another example of the complex problem of effectively connecting a man to a machine.

Closely akin to these problems of information systems is the development of so-called information retrieval devices. There are already available a variety of means for storing vast amounts of information. Depending on the type of memory used, information can be read out of these systems with speeds that range from the merely fantastic to the almost unbelievable. However, as with the human memory, when the amount of information in store is very great, it becomes difficult to describe to the machine the exact nature of the information you need. For instance, if you put the entire literature of a subject such as chemistry into a vast memory, great ingenuity will

be required in classifying the material so that you can always find all the relevant information on any particular subject quickly and easily. Some of the best minds in the world are at present at work not only on the technical, but on the logical and organizational aspects of this problem. Undoubtedly one of the great developments of the next ten years will be the availability of effective information retrieval systems which will greatly increase the usability of human knowledge, whether in scientific research or management. It is interesting that in this field, as in many others, electronic engineers are now realizing that they have much to learn from a study of the human brain, and the computers of the future will undoubtedly borrow much from the organization of this amazing device.

Another closely related field of automation which will simplify many world problems without producing much unemployment is in machine translations. Machines can already make quite creditable translations from, say, Russian to English at a very high speed. The perfection of such machines should prove to be a major step towards removing the age-old language barriers which have interfered with communications between nations.

The trend towards the evolution of automatic systems will continue in operating systems as well as in the management systems which have been discussed. For instance, there will be a continuing tendency for transportation systems to become automatic. Fully automatic vertical transportation systems are already so commonplace that one is somewhat surprised to see an operator in an elevator. It is even hard to recall when only a few years ago many people would refuse to ride in an automatic elevator because they thought it was unsafe. Similarly, the railways and the airlines will gradually tend towards automatic operation. Limited automatic operation of railroad trains and fully automatic landing systems for aircraft already exist.

Another field of automation which we have come to take for granted is the automation of communications systems. I read recently that about 40 years ago experts were calculating that at the rate telephones were being installed, it would be only a few years before every young woman in the United States would be needed to operate the manual exchanges. Now the automatic telephone systems of the world represent one of man's largest and most complex automatic devices. Undoubtedly this automation has prevented the creation of many potential jobs, but nonetheless telephone companies now employ many more men and women than they did 40 years ago.

Even in the field of communications, where automation seems to be far advanced, new and revolutionary ideas continue to appear. The advent of broad band microwave radio systems and of the use of computers for complex programmed switching will make possible great improvement in many kinds of information systems in the foreseeable future.

I will not attempt to discuss even specific examples of the continuing automation that goes on within individual industries and factories. All of you know that there already exist specialized factories which are almost automatic. Oil refineries and chemical plants which are predominantly controlled by computers, automatic warehouses and many other partially or fully automated industrial systems. Technical solutions are available for much wider automation of industry and the automation will progress as it becomes economically justifiable. One of the most fascinating fields of automation within the factory which is going on now is the automatic control of machine tools.

Automatic machine tools which can duplicate parts have been known for a long time. However, in recent years several systems have been evolved for the automatic control of machine tools which make it possible to instruct the machine to carry out a widely variable series of operations with great speed and accuracy. There is no doubt that these new methods of control will revolutionize machining operations in many industries. However, the existence of these machines poses another new and interesting problem. In the past the engineer and draughtsman in the drawing office have made complicated drawings of every part of a new product in order to convey instructions to the man who fabricates these parts. The great mass of drawings required for the construction of, say, an aeroplane or an automobile are in the final analysis very complex instructions to the operators of machines. If the machines of the future have no operators, then there will be no need to make drawings. It would be foolish for the draughtsman to convert his ideas into a drawing, since a drawing is essentially written in a language intelligible to the machine operator, but quite unintelligible to the machine. The instructions would just have to be translated by someone else from the drawing into machine language. I am sure that within the lifetime of some of us here, the drawing as we know it will largely disappear from certain kinds of production operations and the engineer will communicate directly with the machine.

I have described to you a random selection of the present and future areas of automation which seem to me to be interesting and important. I have possibly over-emphasized the system's concept, but I do feel that it is a very important and fruitful idea, not only in the field of automation. I want to emphasize that I have not attempted a balanced presentation of every aspect of automation. I hope that my presentation will not guide the later discussion away from the immediate problems of finding productive and interesting jobs for workers who are displaced by the simpler and technically less interesting kinds of automation that I have not discussed. There is no doubt that automation will ultimately have a tremendous impact on management, on the structure of business and industry, and even on the organization of the country. These effects are of potential interest to every Canadian, but in the meantime many of the less spectacular applications of automatic controls or of new machines will have more important immediate and local social and economic effects. So far in my talk I have deliberately avoided discussing the social and economic implications of automation because I am sure that they will be fully covered by other speakers. However, I cannot resist ending with a word about them.

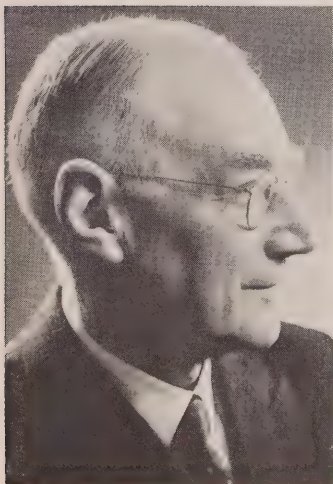
First, I would like to say that I am not convinced that the material goals of our society are the ones to which we should aspire. I believe that mankind would be happier with a simpler and more manageable world, but that is wishful thinking. We must accept the world in which we live and try to make the best of it. Canada as a highly industrialized exporting nation must keep pace with the productivity increases which stem from automation or suffer the economic consequences. I personally feel that in the long run most, though possibly not all, effects of automation are good, but on a short-term and local basis they may be very bad. It is not easy to convince a man who has been displaced from a steady job that he has performed competently and well for years that automation is a good thing. In calculating the economics of individual automation projects, an adequate share of the benefits must be allocated to solving effectively the individual problems of displaced workers. I am sure, too, that the further discussion will deal not only with the number of jobs that will exist in an automated industry, but with the character of the jobs. When automation is introduced, many of the new jobs will be highly skilled, challenging and interesting, but some of those displaced may well be condemned to much less interesting and creative jobs

than the ones which they had before. In the early days of the industrial revolution, it was felt that workmen who were displaced by the mechanization of factories would be re-employed if capitalists would spend their enhanced revenues on personal services. This is still one of the ways in which we are trying to solve the problems of automation. As fewer and fewer workers are needed in the productive industries, more and more are finding employment in service industries. A further extension of this idea is to divert some of the increased earnings and increased leisure which result from automation towards the encouragement of the arts and crafts. If the experts who automate a box factory will spend their new profits on hand-made furniture, the ultimate human results will be good.

I will conclude by a quotation from a recent talk on automation by Dr. Lee DuBridge, President of the California Institute of Technology. He said, and I quote: "Let us not complain, then, if a modern society poses some social problems which the older societies did not face. Starving men do not worry about the regulation of air traffic, telephone systems, railroads or automobiles, or even about labour unions and big business. Nor do they worry about schools, or colleges or churches or hospitals or symphony orchestras or art galleries or theatres. And, of course, they don't worry about fallout shelters in nuclear war. They have always worried about unemployment and even taxes."

THE IMPACT OF AUTOMATION ON SOCIETY

by SIR GEOFFREY VICKERS



A solicitor and author, Oxford-educated Sir Geoffrey was deputy director general of the Ministry of Economic Warfare of the United Kingdom from 1941 to 1943, and from 1944 to 1945 director general of the economic advisory branch of the Foreign Office. A consultant to the 1956-58 University of Toronto "Man and Industry" project, he is a member of the Council of the Royal Institute of International Affairs.

I am grateful to the Government of Ontario for inviting me to this conference and to this city. There is no city to which I more gladly come and few subjects about which I am more readily provoked to reflect.

By automation I understand primarily the progressive replacement of men by machines in the field of *control*.

Mechanisation first lent men *energy*, enabling them to use human skill on tasks beyond human muscles. Next, it began to take over their *skills*, progressively reducing the majority of manual workers to machine minders and concentrating human skills in the functions of machine designing and machine setting. This revolution has still some way to go; there are many jobs on the assembly belt

which could in theory be mechanised without benefit of any sophisticated automation.

The new developments, as I understand it, go much further, promising to replace the machine minder, the shop supervisor, even part of the functions of the works manager by machines and assemblies of machines which control themselves. Somewhere, no doubt, there will be a point beyond which the assembly can only call for help, signalling some failure or defect which it cannot itself correct; so somewhere there will still be a man, ready to be alerted by a distress signal on an instrument panel; but in theory this point may be almost infinitely remote. We had better assume that there are no instructions too complex to be given to a machine, provided they relate to activities within its compass which can be specified; or which can be arrived at by rules which can be specified; or by rules which can be learned in specified ways; or even . . . But perhaps I have gone far enough to satisfy the automation enthusiast that I do not underrate the sweep of his horizons.

These techniques go much further than the control of machines and mechanical assemblies or even the control of physical processes, such as the phasing of supply of materials and components to the places and at the rates required. They extend also to the collection, storage and processing of all data which can be digitally coded or represented by any form of analogue. They are therefore capable of taking over all or nearly all processes of calculation now done by men, from the preparations of a weekly pay sheet to the calculation of joint life annuity rates from the latest mortality tables; and of doing many calculations previously impracticable through the sheer labour involved, like some of the calculations involved in rocketry.

Processing, however, is a wide word. It covers all specifiable operations which present or future computers can be set to do; and this includes many of the constituents of human decision and human judgment. How many we do not know, because we do not know how far our present inability to specify our own mental processes is due merely to our ignorance and how far it is due to peculiarities of the processes themselves. Automation, then, may be able to take over not only most of our controlling and calculating activities but also an uncertain proportion of what seem our most human discretions.

So when we try to discern the impact of automation on society, we should not regard it simply as a further stage of that familiar

process which we know as industrialisation; or assume that its impact on us will be the same as the impact of earlier stages or that we shall be able to deal with it as we dealt with them. I believe we shall not; and this is only partly due to the peculiarities of automation to which I have referred. It is due also to the stage of industrialisation which we have already reached; and we must, I think, first form some view of the state of Western industrial societies in their present stage of industrialisation, before we try to forecast the impact of this further and novel instalment. (Let me apologise in advance for the inaccuracies of which I am bound to be guilty in speaking of so wide a generalisation as "Western industrial societies" from a knowledge, primarily, of my own alone. As an Englishman speaking in Canada, I have found no other way of handling the subject, without too many tiresome qualifications.)

It is extremely difficult to talk about anything so complex as society without first reducing it to manageable order and I must spend a few minutes in describing what seems to me the simplest order which will serve our purpose. I will ask you to conceive your society in terms of three sets of variables. There is first what I might call the physical state of the nation, which could be described in terms of things measurable and observable, such as population, capital equipment, production, income levels, health, employment, housing, undeveloped land, power, water and so on. All these are facts which would be as they might be, whether anyone noticed them or not; but their actual state is as it is; because people do notice them and respond to them and do things about them; and all this depends on another state of the system, which I will call the cultural system. This consists of the concepts and values in people's heads, their idea of the world they live in, of what is desirable and what unacceptable and what matters most. It is, in brief, the way they appreciate their situation and it is this, so far as it is shared, which gives coherence to a society.

This cultural state contains ideas not only of how things are but of how they ought to be. It contains, for example, the novel idea that in a modern industrialised society, a rising standard of living should coexist with full employment. Differences between the way things seem to be going and the way we think they ought to be going are of great importance, because these disparities are the signals which guide policy and call for action. They are to a social system what the

mis-match signals of the engineer are to a self-regulating system in industry.

But before we can form an idea of what a society will actually do in response to such signals, we have to look at yet another state of the nation, which I will call the institutional state. This includes the society's institutions of government and business and law and its social institutions, like the family and the class structure and the ways in which these are set to act. These are the means through which a society copes with its problems and they limit what it can do. They even affect what it will notice.

The factors which make up all three states, the physical, the cultural and the institutional, are changing all the time and changes in any set affect the other two; which is why it is so hard to talk or think clearly about impacts on society; but without too much simplification we can say that these mis-match signals which make "impacts" on us may arise because the actual course of events, as we perceive it, begins to depart from what we regard as acceptable or because our ideas of what is acceptable begin to change, so that we feel impelled to alter what we were formerly ready to accept — or, of course, through the operation of both. Unemployment, for example, may rise "unacceptably"; or we may change our ideas of the level of unemployment which we should accept.

And this brings me to what I believe to be the root of the dilemma, a dilemma which exists already, apart from automation. In developed Western states both the physical and the cultural state of the nation have changed and are changing. We expect our societies to meet complex and increasing demands for affluence, security, status and ease; and to meet them not just on the whole and over the years but for the great majority of us and every year. Most of these expectations are novel; our institutions were not designed to meet them. What economist or business man a century ago, what politician, what voter could have conceived a situation in which governments might fall if vacant jobs and idle men failed to balance within a margin of about 5%? We do not know what changes in our institutions or in our other expectations would be needed to enable these demands to be met or whether they can be met at all. And that is why the growth of automation at this stage is likely, in my view, to have unusually violent repercussions.

Consider first the separate, though related questions of unemployment and leisure. Every year a large number of young people becomes available for employment. Apart from immigration and emigration, this number is virtually fixed by birth rates and mortality rates over several previous years. The capacities of these people, in so far as it depends on their genetic heritage and on their education and training up to maturity, are also by that time "given". Their numbers are greater than the vacancies caused by death and retirement. Yet we expect them all to find places as producers and we have no other means of giving them status either as consumers or as members of society. The increase both in the numbers of producers and in productivity is supposed to be absorbed "automatically" by more consumers, a higher rate of consumption and increased leisure.

I am not an economist but I see no reason why this equation should hold indefinitely and still less why it should hold "automatically". It would hold, even in theory, only if consumption were indefinitely expansible and leisure infinitely divisible; and it would hold automatically only if the system included automatic regulators for distributing both purchasing power and leisure. None of these conditions exists and the history of our institutional development, no less, I believe, in North America than in Europe, has been largely the history of successive attempts to create such regulators. So this is perhaps the place to take a glance at the institutional state of the nation.

For two centuries the Western world has been exploring first the possibilities and then the limitations of the greatest automatic regulator of human affairs ever devised by man. This is a free market in goods, services, labour, money and ideas and free access to those markets for all. This is far more than a prescription for economic expansion. Its early enthusiasts believed that it would ensure indefinitely, peaceful change in the direction of the self-defined well-being of each and all. This is, unhappily, too much to expect of any regulator and the last century has seen its weaknesses patched by successive corrections, similar in kind in every country concerned.

The system first proved inadequate to distribute the purchasing power required fully to meet its own needs. This defect was patched, partly by redistributing income through differential taxation and state benefits and partly by collective bargaining. It proved, further, inadequate to meet those demands that call for collective, rather than

individual spending, the demand, for example, for roads, as distinct from automobiles; and this was patched by diverting ever more spending from the private to the public sector. It proved still more inadequate to meet those needs which are least readily supplied through a market at all, in particular those services like education, medical care and many welfare services, which are felt primarily by those least able to make their wants felt through a market; and this failure was exaggerated by the weakening of institutions like the family and the local community, through which they had once been met. These defects are now being patched by the effort to create, professionally and institutionally, all those supportive services which the social institutions of the country no longer supply.

Above all, this system proved inadequate to regulate its own growth; for example, to regulate the growth of cities, the distribution of land use and the patterns of communication. These defects were patched first by developing an increasing net of negative governmental powers, to curtail what was not deemed to be in the public interest; and then by an increasing number of public agencies, like the Hydro and the Seaway authorities, designed positively to do what needed to be done.

And alongside these institutional changes, there have been important cultural changes. The so-called "private" institutions of business are expected and even expect themselves to accept responsibilities for the social implications of what they do, which would have scandalized the business men of even one generation before.

Thus there has emerged the familiar picture of the "mixed economy" — familiar, that is to say, to us who live in it. It may be that to future ages or even to our contemporaries in other cultures it may seem like one of those evolutionary monstrosities which have exhausted all their possibilities of piecemeal adjustment and must now mutate or disappear.

One of the less encouraging aspects of the system is that, despite the existence of large areas of unsatisfied need, consumption is maintained partly by mammoth expenditure on unconsumable services like armaments and space research and partly by deliberately designed waste, commonly called "built-in obsolescence". But more serious, perhaps, is the current weakness of the system in distributing leisure. This is done, so far as it is done, in two ways. On the one hand, govern-

ment, by a variety of constraints and inducements, increases the years which we spend in education and in retirement and thereby to some extent reduces the working population; though this has been more than offset since the war by the increase, officially encouraged, in the number of married women at work. On the other hand, the weekly hours per head actually worked falls, though slowly, through the demands of the employed. It is not surprising that the creation of leisure should be even more sluggish within the system than outside; for the system is set to maximise what can be sold and leisure cannot be sold. Moreover, since in our culture, itself largely the product of the system, status and success are closely geared to employment and income, demands for leisure are likely to be half-hearted.

You may find this report on the institutional state of the nation unduly dark and distorted. It may be so; but I believe that it stresses those aspects which we need to have in mind when we try to forecast the social impacts of automation. I am concerned with impacts, not with effects. I cannot predict what the effects will be, here or elsewhere; I believe that they are logically unpredictable, for they depend on the responses of men and institutions to events which have not yet happened and to the effects of their own responses. All I shall attempt is to explore some of the first impacts on societies constituted as I believe ours to be and to enquire what responses are likely to be open and at what cost.

I choose four impacts. Automation must increase, perhaps dramatically, the productivity of industry; and this dividend must be taken in increased consumption or in unemployment or in leisure — in fact, no doubt, in all three. Further, as I understand, automation is likely to operate selectively in a way not seen before. Hand operatives made idle by the spinning shafts and dangling belts of 19th century mills returned in time to produce more, though usually with less skill; but the men and women made idle by automation will not be needed to operate the machines which displace them. They will need greater or different skills to regain a place in the world of work. Further, they will include clerical and supervisory, as well as manual workers; workers not only in industry but in every branch of administration, and not least in government. Thirdly, automation will affect the organisation and the thinking of all those organisations which adopt it — again, a far more comprehensive group than were affected by any previous impact of industrialisation.

Finally, in so far as the dividend is taken in the form of leisure or unemployment — and some of it must, I think, take one or the other of these forms — it will have an impact on this “leisured” sector of social life — the sector not structured by the demands of work — which might wholly change its character.

In considering these four impacts, we might usefully bear in mind one truth of fairly general application. When a society of any kind is called on to adapt to some change in the relation between its perceived situation and the standards by which it judges this to be acceptable — when, in other words, the stream of mis-match signals alert it to the need to do something other than it is already doing — it normally proceeds along the line of least resistance. First, it intensifies familiar responses; then it may devise others; it may even set up new institutions to give effect to them. Next it may be forced to modify its existing institutions to make room for the new, and to accept, at first only as a temporary measure, changes in its culture which these necessitate. Only in the last resort will it be driven to question the assumptions which create the problem, to ask whether the question which it is trying to answer is in fact the right question, and thus perhaps to change its normative expectations.

Consider then first the impact of rapid and prolonged increase in productivity, sufficient to upset unacceptably the precarious balance between available jobs and people available to do them.

If new responses are needed, what are available? The most obvious is some means of giving production away. It is indisputable that most of the world is short of the necessities of life and that even in prosperous societies real poverty still exists. Employment could be found for some time at least for all potential producers, even in prosperous countries, in creating surpluses for other people to consume — provided that those others were content to consume more than they produced and had some system, as we have not, for distributing unearned surpluses.

This situation is not new. Much of Britain’s export surpluses in the 19th century were paid for out of the proceeds of British loans which were never repaid and many of which, as latter day economists would have seen, never had a chance of being repaid. Some U.S. surpluses since the war have been distributed more rationally and generously as “aid”. Is this process capable of development on an

entirely new scale? Is it likely to be? Should it be? I do not know, but it does seem clear that this is the only direction yet mentioned in which there might be room for the consumer-producer relationship to go on as before. Social effects would thus be cushioned, though at the cost of a major economic innovation. Failing this, we have to consider the problem of absorbing this unused and unusable capacity in the form of leisure or unemployment. Before exploring this, let us look for a moment at the second of my chosen impacts, the selective nature of automation's impact on employment.

How serious this qualitative threat may be I do not know; I hope to learn more from this conference. Any man, however unskilled, is capable of discriminations which could be equalled, if at all, only by the most sophisticated and expensive bit of automation; and one of the few industrial studies to be made by a psychiatrist¹ found no single job, however humble, in an entire factory, to which some element of discretion was not essential. A night watchman, dozing over a coke brazier by some road contractor's site, if he could still be found, might seem a 19th century relic; but the poor fellow, clinging to the margin of unskilled employment, can tell the difference between a cat upsetting a pile of bricks and a thief making off with the day shift's gear; and it would take a fabulously expensive piece of automation to do as much. The returning day shift, with their picks and shovels, will be more than a match for a mechanical digger, however automatically controlled, when it comes to uncovering a water main at the still uncertain point where it has burst. Examples could be multiplied. I have had a great respect for unskilled work since I saw supposedly unskilled men in British coal mines handling free running trucks of coal, on dark gradients underground, in conditions in which I felt sure that many high-powered administrators of my acquaintance would have been rolled flat in an hour. It seems to me that there is a field, and an extensive field, in which men, even illiterate men, can compete with machines, whether as control mechanisms or as computers, for as far ahead as I can see.

The fact remains that many jobs, manual, clerical and supervisory will be taken over by machines in the next decade; and it is not to be assumed that the men and women so displaced can be retained for any work which will then be available, even in conditions

¹ Jacques, E. *The Measurement of Responsibility*.
(1956) London, Tavistock Publications.

of full employment. How acute a short-term crisis this will produce depends on the speed at which it is allowed to take place. How acute will be the long-term crisis depends on whether, through the whole remaining range of human employment in the automation age, the human gifts required are so specialized as to impose a qualitative bar to any substantial section of workers, in addition to the quantitative limitation of total available work. I do not know whether anyone is in a position even to guess the answer to this question; I certainly am not. I think I can usefully make only two comments on this aspect of automation. One concerns the rate of change.

It is sometimes said that every technological change that comes is "bound to come"; sometimes even that its rate of coming cannot be controlled. These defeatist observations are, I believe, false. Those who make them really mean either that to resist or seek to check such changes would be wrong, by some canon which they have accepted too deeply even to defend; or that its cost would be more than they would think worth paying — though exponents of the view seldom count the cost of *not* containing the rate of change. As Norbert Wiener has observed² — "It is one of the paradoxes of the human race . . . that the people who control the fortunes of our community should at the same time be wildly radical in matters that concern our own change of our environment and rigidly conservative in the social matters that determine our adaptation to it."

Of course the rate of change can be controlled; most regulation consists in phasing divergent rates of change. Only the id cannot wait; and it is the ego's business to teach it manners. It is true that our present official regulators are ill adapted to regulate technological change in industry; but our official regulators are being forced to learn new tricks in this, as in other fields; and other powerful regulators could help them if the will were there. Industry has some experience of delaying innovation until investment on the phase to be replaced has been recovered; and in the matter of changes affecting employment trade union organisation supplies a regulator happily more powerful today than that improvised by the Luddite workmen who broke up the new machinery in my native town of Nottingham 150 years ago. The lesson which Canute taught his flattering courtiers from his encounter with the tide was to recognise independent vari-

² Wiener, N. *The Human Use of Human Beings*.
(1950) Boston, Houghton Mifflin Co. p. 56

ables. I do not doubt that that competent executive (who conquered my country at the age of twenty one) would have given his counsellors an even sharper object lesson, if they had tried to persuade him that he could not control unwelcome tides of their own making.

My second comment concerns the future of those occupations and professions which cannot readily be automatised. Some simpler aspects of teaching may pass to teaching machines; but I hope that a day will not come when we are automatically nursed, or legally advised or even medically diagnosed. Will these occupations, some of them undermanned and underesteemed today, grow in prestige and in quality through the automatising of activities which today compete for their recruits? If this should occur, it would introduce a great and beneficent social change. Logically we might expect it. Surely, as the meeting of our simpler needs becomes more and more automatised, prestige should gravitate to those services which can be rendered to men only by men.

Logically it should; but psychologically I doubt whether it will. The reasons appear from a consideration of my third impact area, the effect of automation on the organisation and thinking of industry and of all other activities which come to depend on it, especially the activities of government.

Mechanisation has caused the progressive atrophy of jobs which cannot be mechanised. The market carries more and more mass-produced products — differing from each other less and less — but it becomes harder and harder to buy anything which is not mass-produced or to get any kind of individual service; harder, for instance, to get an erratic ball cock mended than to buy a new sink unit. As automation spreads, will products which cannot be automated wilt in the same way? I fear that they will, not merely in face of economic competition from processes which automation has genuinely cheapened but from the prestige of the new technique. The spearhead of technological advance will be the automation of processes not automated before. That is where the brains, the enthusiasm and the money will be. Business is an adventure for those who conduct it, an investment only for the faceless, voiceless millions who finance it. The judgement “this job needs a man”, even the judgement “this job doesn’t need an automaton” may be only a business judgement to the financier but it will seem like a confession of failure to the development engineer.

I have no doubt that industry will distort and narrow its function to no small degree to get the new techniques in.

This, however, seems to me a relatively slight danger, compared with the corresponding danger inherent in automating processes of data handling and decision. In this field the new processes will of course have solid as well as specious merits. They will be quick and reliable within their limitations. They will carry the authority of calculation, as against mere opinion; what they produce will be not "an answer" but "the answer". And they will not easily be combined in a process in which any single element cannot be specified. How great the temptation to specify the uncertain, to omit the doubtful, to simplify the problem sufficiently to get it on to the machine! And once it is there, who will discover or even remember the built-in limitation?

I am influenced by personal experience, even in this still unautomated world, of the power of the measurable to dwarf the non-measurable. I recall times when I have criticised some forecast or estimate for omitting some variable which must obviously be relevant to the result and have been answered — "We couldn't include that, we couldn't put a value on it." And if I objected — "But by omitting it, you have valued it at zero; and you know that is the only value it *cannot* have," the answer — given in the sad, patient voice which the professional keeps for the amateur — would be — "No; we haven't valued it; we have only omitted it." And then, triumphantly — "Look, one of the footnotes says so."

I fear the alluring possibilities of automating decision processes, first, because the decisions which lend themselves to be so treated are decisions about the best means to reach given ends, where the criteria by which means are judged best are similarly given at the outset. I believe that no important decisions are of this type and that those which appear to be so usually conceal more important questions which ought to be dealt with first. I fear that automation will further bury these essential issues. Intractable problems are usually solved by being restated; their "facts" are found to be irrelevant. Vast vested interests resist such restatements; and I fear that automation will make these vaster still. Most of all, I fear the possibilities of automated decision-making, because I believe that the criteria which determine important decisions are only evolved by the process of decision itself and that this process, so tedious and necessarily only

half-conscious, will be further jeopardised by the appearance of the new technique and the new mystique, with its panache of certainty. In so far as men necessarily become slaves to their techniques, this is the area in which slavery is most to be feared.

But why should men become the slaves of their own techniques? This is one of those questions which can only be answered by being restated. "Slave or master" is not the choice between man and machine, any more than it is between man and man. These are extremes in a gamut of relations which are always mutual. The slave owner is moulded by his mastery, no less than the slave by his slavery; and so it is for all the relations between these extremes. We recognise this between man and man; we should recognise it also between man and machine, man and technique, man and institution. How powerfully were 19th century ideas of human relation moulded by mechanical concepts of energy and causation! Even human authority was conceived as akin to mechanical pushes and pulls. A world dominated by techniques of communication, accustomed to distinguish the flow of information from the flow of energy will be different from the world today in its thinking about all relationships. It will not necessarily be more human; but one can hope it may.

The peopling of the world with self-regulating machines may teach us respect for self-regulation, which would be no small advance; it would at least set us an example better than the bulldozer. The limits of automation, when they appear, may remind us that there are human excellencies beyond problem solving.

And this may be affected by my fourth impact area, the growth and structuring of that section of human life called leisure.

Industrialisation produced a culture in which status as well as income came to depend very much on employment. Indeed, it was a matter of pride that industrialisation dethroned status and replaced it by contract. The free man might become anything. By the same token, until he had become something, he was not anything. This trend, never of course complete, seems to have been reversed. We are busy rebuilding the status of the citizen as such. I doubt if the dominance of contract was ever accepted, except as an outrage, by any except the minority for whom work was not only a livelihood but a career. (Perhaps we are the poorer for the unavoidable fact that nearly all successful sociologists fall into the latter class.)

Now as the world of leisure develops from a mere interlude in work into an area large enough to need and generate its own significance — and of course it is already doing so — what shape will it take, what values will it evolve? It will be an unfamiliar social pattern. In the past the leisured class has been drawn from the rich; in the brave new world which is coming, only the rich, it seems, will be busy — or at least busy of necessity.

This leisured world has already some interesting characteristics. Its inhabitants “do it themselves”, partly for fun and partly because no one they can afford to pay will do it for them. No doubt they sometimes do it together and do it for each other. Will this expanding world of leisure generate a culture complementary to that imposed by automata, who will increasingly populate the world of work? Such complementary cultures, even protest cultures are not unknown today. Will it perhaps in time become more dominant than the world of work, become the cultural world in which all live, even though some “go to work” from it?

I do not know. I am sure, however, that as leisure increases and especially if it contains a quotient of compulsory leisure in the form of open or concealed unemployment, the character and quality of the leisured area will be of critical importance for our societies, will reflect for good or ill the most important impact of automation. How in our various societies this area will grow, what will be the form and content of the culture and institutions, which will assuredly arise to structure it, these I believe cannot be even theoretically known, though they can be practically influenced; for they will be the fruit of an appreciation which can never be divorced from active participation. They carry at least the possibility that men may find in them an escape from the monkey world of techniques into the truly human world where they can exercise the inalienable activities of human beings, skill, appreciation, sympathy, delight and wonder.

PANEL: AUTOMATION, ECONOMIC GROWTH AND UNEMPLOYMENT IN CANADA

An Economist's Viewpoint by Dr. W. Donald Wood



A professor of economics, Dr. Wood directs the Industrial Relations Centre of Queen's University. He received his education at Queen's, McMaster and Princeton Universities. He is the author of several research studies, has published articles on industrial relations and economics and is a member of many professional societies. He had five years' service in administrative and personnel posts in the RCAF.

Because of the complexity and scope of this topic, I can do no more in the 25 minutes at my disposal than present the most general and arbitrary statements on the subject. I trust that my remarks will provide a background for more specific comments by my colleagues on the panel and for the general discussion to follow.

The word "Automation" means many things to different people. In my remarks I intend to focus on the larger processes of technical change and innovation as well as on automation as it is often more narrowly defined.

There is probably no contemporary subject about which there is such a great deal of confusion and so many differences of opinion as

automation. In large part, these differences stem from two main causes:

first, the fact that very little is known about it or about its various impacts; we still have no good quantitative measures of the extent and significance of automation, e.g. its effects upon employment and unemployment, upon output, prices and wages, etc.; secondly, the fact that it has generally had different effects on different groups and areas in our society.

While we may know little about the specifics of automation, there is a growing consensus that this is a most significant development in terms of its economic and social implications. Its application has been extended widely and rapidly in recent years. Its potentials for the future are enormous. Its impact runs broad and deep. It has implications for every segment of society.

First, then, let us look at the *employment and unemployment aspect* in Canada in the post-war period. At this stage, I do not intend to say anything about causal relationships between automation and unemployment. Rather, I shall simply present a few facts about the levels, duration and characteristics of unemployment in the post-war years.

Regarding the *levels of unemployment*, the most significant fact is that there has been a gradual rise in our unemployment rate throughout the post-war period. If looked at on a trend basis, this rise is quite distinct. In fact, we have come out of each post-war recession with a higher unemployment rate than from the previous one.

While the rise in unemployment levels has been a steady one, it is most marked since 1957. From 1946 to 1956, the average annual unemployment rate was 3.2 per cent. Over the period 1957 to 1962, the average annual unemployment rate rose to 6.3 per cent. Despite a substantial recent improvement in the rate of economic activity, it is clear that economic growth has not been sufficient to lower unemployment rates to the level of the early post-war years.

At this point, I would like to dispose of the illusion that Canadian unemployment figures are high because of the statistical definitions and methods used in estimating unemployment. In fact, if we take into account the amount of disguised unemployment which results from persons working reduced hours and from people dropping out of

the labour force because work is not available, our unemployment rate would be higher than it is actually shown to be. While it may be that some of the unemployed have only a very tenuous attachment to the labour market, the net effect of our present official measurements is to understate the level of unemployment. Likewise, there are no grounds for the allegation that unemployment rates in Canada and the United States are higher than those of other leading industrial nations because of the different measurements used. Evidence indicates that adjustment to North American definitions results in lowering the unemployment rate of the foreign country more frequently than raising it. The point I wish to make is that no matter how it is measured, Canada has been a long way from full employment in recent years.

Not only has there been a gradual increase in the level of unemployment during the post-war years, there has also been a steady rise in the *average duration of unemployment*. This is largely a reflection of the types of unemployment which we have experienced in recent years, although it reflects also certain barriers to labour mobility in the economy.

Reference to the types of unemployment which we have experienced leads into the question of the *incidence and characteristics of unemployment in recent years*. A feature here is the unevenness of unemployment among different industrial, occupational and geographical groups. Its main characteristics are a heavy incidence among workers in the goods-producing industries, and among persons in the unskilled occupational groups. As the Senate Committee on Manpower and Employment has pointed out, there is a striking relationship between education and unemployment, indicating that inadequate skills and education is a serious handicap in today's labour markets.

Discussion of the levels, duration, and characteristics of unemployment leads into the *current debate of what is responsible for this unemployment* — insufficiency of aggregate demand or structural problems resulting from inadequate adjustments to supply and demand, particularly those relating to dislocations in the labour force as a result of technological change. It is easy to take one side or the other. However, the problem is more complex, for the two are interrelated and by no means mutually exclusive. It would seem that both factors have been responsible for our unemployment. We have had a rapid spread of automation and other structural changes result-

ing in serious adjustment problems. What has made adjustment so difficult is that they occurred at a time when there has been a slowdown in Canada's rate of economic growth. The crucial point, then, is that we have not had enough expansion to provide employment opportunities for our rapidly expanding labour force and for those displaced by the increased productivity generated by technological change. Consequently, the problems of adjustment have been more difficult than they would otherwise have been in a more favourable economic climate. Nevertheless, these structural problems cannot be lightly dismissed for they in turn have also inhibited the processes of economic growth.

No matter how you look at it, or what statistics you use to measure it, there is little doubt that there has been a *slowdown in the rate of growth* during the last six or seven years. For example, if we look at the yearly change in GNP in constant dollars, which is one commonly accepted measure of growth, we find convincing evidence of this slowdown. From 1946 to 1956 the average yearly increase in GNP was 5.6 per cent. In the period 1957 to 1962 it has slumped to 3.3 per cent. This trend is also evident if we look at other measures of growth such as real GNP per capita or real GNP per member of the labour force.

At this point I would like to emphasize that the whole question of economic growth is a very complicated and difficult subject and that at present we have only a hazy understanding of its processes. The extremely complex interrelationships involved in economic growth cannot be easily generalized and warn us against any simple economic solutions to the problem. It is important, however, that we recognize three broad, interdependent elements of the growth process:

First, it must involve a rise through time in the demand for goods and services produced in the country;

Secondly, it must involve an expansion through time in the productive capacity of the economy;

Thirdly, it must require a high degree of mobility and adaptability of resources, so that there are no rigidities and obstacles to keep management, labour and capital from adjusting to changes in the structure of demand and supply conditions. In a country such as Canada, with its vast geographic distances, small population and uneven distribution of industry and employment, this flexibility is a particularly difficult objective to attain.

While we are not exactly clear about the impact of automation on employment, it is clear that *automation is an important factor in altering the industrial, occupational, and geographic structure of employment*, and that this requires adaptation and mobility of resources. Industrially, we have had a shift in employment from the goods-producing industries — such as manufacturing, agriculture, and mining — to the service industries, and from blue-collar occupations to white-collar occupations. For example, in manufacturing, output increased between 1946 and 1956 at an average rate of 6.0 per cent a year. During the same period, employment increased by 2.5 per cent a year. Between 1957 and 1962, output increased at an annual rate of 4.4 per cent. Employment *declined* by an average of 0.5 per cent each year. This illustrates, then, the feature of increasing output and decreasing employment in the goods-producing industries. As employment opportunities have declined in the goods-producing industries, they have expanded in the service industries.

One of the most dramatic results of current technology is its impact on the structure of the labour force. Its effect is to increase the need for people with substantial education, skills and adaptability and to reduce work opportunities for those who lack these characteristics. Thus, there has been a marked increase during the post-war years in the demand for professional, technical and skilled workers. On the other hand, there has been a relative decline in the demand for unskilled and semi-skilled workers. In 1949, for example, white-collar workers made up 31.4 per cent of the labour force. In 1962, the average proportion of white-collar workers in the labour force had risen to approximately 40 per cent. We have, then, the paradox of on the one hand a growing scarcity of adequately trained and educated workers and on the other a surplus of unskilled labour. These shifts in the demand for labour pose serious problems of adjustment and have important implications for industry, labour, all levels of government, educational authorities and the public at large.

In conclusion, then, it is evident that we have many difficult and complex problems ahead of us relating to automation, unemployment and economic growth. It has been pointed out recently that "technical advance leaves in its wake a network of contrasts, contradictions, and imbalances. And whereas the resulting imbalance makes adjustment necessary, the network of contradictions makes adjustment difficult to achieve." Thus, on the one hand we in Canada must push forward

with more automation in order to keep pace with growing international competition, with our social needs, and with our international obligations. On the other hand, this necessary technological change will provide difficult problems of adjustment. We must ensure, then, that there are appropriate private and public policies to cushion the impact and dislocations of automation. Since its gains are shared by society as a whole, we cannot have the costs borne by one segment of society only. They must be spread equitably. In my opinion also, it will be economically, socially and politically impossible to reap the full benefits of automation unless these difficult adjustment problems are solved.

Moreover, these problems cannot be solved by any one segment of society. What is urgently needed is a *coordinated approach* to the question of automation by all private and public segments — by industry, labour, all levels of government, educational authorities and the general public.

As I mentioned before, our key task is to achieve a rate of growth large enough to provide jobs for our expanding labour force as well as for those displaced by improvements in productivity. Because of the great influx of young persons expected to flood the labour market in the years ahead, and because of the expected rapid rate of future automation, we need not just growth but very substantial growth. To this end we must have appropriate public and private policies to develop the three interrelated strands of economic growth noted earlier — an increase in aggregate demand, increases in our productive capacity, and the removal of obstacles to mobility and adjustment. These strands are mutually reinforcing. If one is weak, an intolerable burden is put on the others. Consequently, we must have appropriate government fiscal, monetary, trade and regional policies. We must have appropriate income and price relationships; while at the same time, we must improve the mobility of our human resources by better information, guidance and placement in our labour market, by eliminating the various institutional barriers to mobility, and by expanding and improving our educational training and retraining programmes.

Time does not permit discussion of the many private and public policies needed in these areas. However, the question of education and training is so important that I might just say a word about the *huge task of improving the skills and adaptability of our work force* to meet

the changing world of work in an age of science and technology. In the past, Canadians may have been lulled into a false sense of security by the large natural resources which we possess. However, I would suggest that in an age of science, education and know-how will be the critical factors in achieving a high rate of growth and in adjusting to new developments. Our future economic expansion will depend even more on the quality of our human resources than on our capital and physical resources.

A first crucial step in any programme designed to solve our manpower problems is *fact-finding and research into these human resources*. This knowledge is essential for effective action based upon firm, factual foundations. For example, rational policies concerning education, training programmes, social security and unemployment compensation, etc., must be based on a factual and intimate understanding of these subjects. Unless the facts are available, it is impossible to advance policy suggestions on a realistic basis in either the public or the private sectors of the economy. Moreover, unless this type of information is available, the decisions and actions of Canada's youth and workers regarding the choice of jobs or occupations can hardly be made with any validity. Some good work has been done in this area, for example by the Senate Committee on Manpower and Employment, by the Ontario Select Committee on Manpower Training, and by various government departments, and by others. However, we have to face the fact that we still have much to learn about the characteristics of our available manpower resources, about our future needs for specialized talents and capabilities, and about the educational and training facilities and programmes required to meet these needs.

In short, then, we are going to need a *massive and immediate programme of fact-finding and analysis* in order to find out with some precision what our economic problems are — problems of automation, manpower, economic growth and related areas. As a former Harvard University President has said, "The great art of life lies less in solving problems than in discovering the problems to be solved". While, as I have said, we have made some progress in recent years in fact-finding, research and analysis, we still need much more if we are to have a clear picture of the dimensions of our problems and of the steps we must follow to solve them in today's world. Past experience alone is not enough for the new and complex problems we face. We

realize better every day just how much more we need to know about our economy. The patterns and trends of automation must be carefully studied; its implications for unemployment and economic growth must be analyzed in detail. It may even be some day that computers and automation will themselves be the means which enable us to solve our unemployment problem, including that portion caused by its own introduction. For the moment, however, we cannot rely on this possibility. We must do our own fact-finding and research. In our emerging world, knowledge is rapidly becoming the crucial basis for the successful operation of all segments of our economy. We must ensure that ignorance of the facts and of the relationship between facts do not prevent us from solving our new and complex problems.

A Management Viewpoint by D. G. Willmot

Mr. Willmot is the president of Anthes Imperial Limited of St. Catharines and its subsidiary companies, as well as being this year's chairman of the Ontario division of the Canadian Manufacturers' Association. He was born in Toronto and graduated in engineering from the University of Toronto. Before coming to Anthes Imperial he was with Canadian SKF Company of Toronto and Atlas Steels in Welland.



It is with diffidence and some trepidation that I appear before you today to talk on a subject as complex and challenging as automation and its influence on economic and social trends in Canada. I find there

is a vast amount of written material available on this topic and it is receiving an increasing amount of attention, not only from those most directly involved — employer, employee, and government groups — but also from some of the excellent minds in the educational field who are concerned with an assessment of the problems of automation and the considerations involved in planning for the benefits and problems it creates.

I believe I should point out at the outset that while my invitation to join this panel today no doubt is due to the fact that I am Chairman of the Ontario Division of the Canadian Manufacturers' Association — and I might say that it is a privilege to represent that group — I am also a practising manufacturer who feels no small sense of responsibility to his own organization to face up to the implications of automation, and I can assure you I share a great deal of concern along with most of you here today.

Like others, I perhaps could give you chapter and verse that mechanization or technological development has been going on for centuries. One could start with the invention of the wheel, the mechanization of production through the invention of the steam engine, the transition to the electric motor, and so on to the development of electronic devices leading to automatic controls. The new term we are using today — automation — is of relatively recent origin but is in no way a new phenomenon. Neither is the controversy new that a discussion of the topic creates when its effects on employment are considered. Certainly each great advance in technology has raised fears that machines would take work away from people and deprive great numbers of their means of livelihood. The worry over automation seems to be the same old controversy with a new name.

Whatever we call it, however, the record shows that the issue is based more on fear than fact. Extensive unemployment is generally related to a result of monetary or fiscal environment; yet changing technology inevitably gets a large share of the blame. In fact, quoting from the Report of the Select Committee on Manpower Training set up by the Ontario Government, this point is further borne out, "Full employment depends much more upon an adequate level of aggregate demand than it does upon the skills of a country's labour force. General unemployment is thus more likely to be eradicated by appropriate fiscal and monetary policies than it is by huge expenditures on education and training."

It is true that we read that there have been more scientific and technological developments in the first half of this century than in all of time up to the beginning of the century and that there has been as much in the last ten years as there was in the previous fifty years. However, when we relate these trends to manhours of work, man-hours per unit of output, and total production, one must conclude that in this respect the effect of technological improvement on the work force is generally slow and gradual.

Statistics show that, while output has climbed steadily throughout most of this century, the manhours of work needed to produce our growing abundance of goods and services has risen at a slower rate. The one big exception to this trend was the period during the depression of the 1930's when hundreds of thousands of people lost their jobs. But we all know they were not thrown out of work by rising productivity.

Insofar as manufacturing is concerned — and it is natural that we turn our minds to factory operations when the question of automation is raised — figures show that improvement in factory productivity has been substantial since 1947 — actually 3.5% a year from that date until 1960. It is helpful to go back into history to see what happened prior to that time. John W. Kendrick in his publication *Productivity Trends in the United States* indicates that for the 10-year period from 1909 to 1919 the annual rate of increase of productivity per manhour was only .8%. Then, during the period immediately following the First World War there was an annual rate of increase in productivity of 5.6% from the years 1919 to 1929. While there was a fall-off in the early '30's, this relatively high rate of annual increase was again restored approaching the year 1937 — perhaps due to some measure to the result of the depression which eliminated inefficient operations. Between 1937 and 1947, however, the rate of change dropped to 1.4% per year — no doubt affected by the interruption of the war.

The 3 to 3½% rate of annual increase that has prevailed since 1947 is therefore just about the average of the past fifty years. Therefore, the statement that automation today is producing a very spectacular rise in productivity, thereby causing an unusually severe and widespread unemployment problem, is not borne out by the facts. The nature of the technological changes being introduced into industrial manufacturing has altered but the trend has been con-

tinuous. In spite of spectacular improvements in productivity in certain individual processes, the overall picture today is not essentially different from that of the last forty years.

The net effect of the gradual increase in productivity means that with an approximately constant number of manhours per year (the rising working population being nearly compensated by the decreasing number of hours worked per week), it has been possible to double the output of industrial production every eighteen to twenty years while the population has been doubling every thirty-five years. This, of course, is the primary source of an increased standard of living which this country has been attaining over the past century.

While people are quick to notice any jobs lost when automation is introduced, they tend to overlook the jobs created when the new equipment is built and serviced or when new markets are opened because of lowered costs and prices. Indeed, one of the main reasons for automation is that there are not enough workers with the abilities needed to meet the demand. There are literally hundreds of examples which could be cited to illustrate that the benefits derived from automation far outweigh the problems that might be created.

Let me cite the case of the Bell System in the United States, because I happen to have these figures, and this comes from a report released in 1960. It reads as follows:

“Since 1920 the Bell System has been building the world’s largest computer — the nationwide dial telephone system. About 96% of the fifty-nine million Bell System telephones are now dial operated.

The 730,000 men and women now working for the Bell System companies are more than two and one-half times the number employed in 1920 when dial conversion began. Service has improved tremendously. A 3-minute cross country call costs \$2.25 today; in 1920 the price was \$16.50.

Without automation, telephone service long ago would have been priced out of the reach of a large portion of present subscribers. It is also a fact that had automation not taken place it would not now be possible to get enough qualified people to provide the volume and scope of telephone service which the public, industry and government need and have today.

It is figured that if the Bell System had not begun installing the automatic switchboard in the 1920's, it would now require all of the single women between ages 18 and 30 in this country to handle the ninety billion telephone calls Americans make each year."

Another simple example has to do with the widened use of automation in banking. You will have noticed the magnetic identification code on your cheques these days. Banking is a growth industry in terms of physical work done with an average increase in cheques handled over the past decade of 6% per year compounded. To limit the needs for additional manpower and to keep the costs of banking service as low as possible, these institutions have been forced into greater use of automation.

I am sure we all recognize that the one person in the final analysis who benefits by increased productivity and resulting lower costs is the consumer. The intensely competitive and relatively free industrial environment in which we live today has served the population very well indeed and has permitted an increasing standard of living which simply would not have resulted from any other economic system.

The impressive benefits which have resulted from continued improvement in productivity can be seen by looking about us. Compare the way of life of a typical citizen in any Canadian city or small town with that enjoyed by his counterpart of 100 years ago — or by his counterpart today living in any village of Africa or Asia. Those who object to and resist today's automation must logically reject yesterday's mechanization — and must then reject as undesirable the whole process of industrial development and technological improvement. They must advocate, in short, the return to the most primitive forms of society of hundreds of years ago — a society which by now, with population increases, would be choked and paralyzed by hunger, disease and poverty. Obviously, none of us would wish to see that.

Let us not complain then if a modern society poses some social problems which the older societies did not face. Automation is just a fancy new word for progress. We have nothing to fear from progress — we have everything to fear from lack of progress.

Up to this point, I know it would appear that I have built a strong case in favour of automation. That has not been my prime

purpose however. What I have tried to do is establish the point that technological improvement is an essential part of a competitive free society and our very survival in an economic and military sense requires that this process will continue. In addition to this, we must be realistic in our assessment of the unemployment and worker dislocation problems in a growing industrial country — and to try to solve such matters by retarding progress would be disastrous. I am sure most of you labour men in the audience today, as have many of your enlightened leaders, agree with this point of view.

I want to say most emphatically at this point, however, that I do not belittle the serious problems we face. They are in many ways frustrating — perhaps even terrifying — and I know the solutions we must seek together will not be readily found. As long as there is unemployment in our midst and any Canadian is living with something less than what he has a right to expect from our way of life, then the problem must receive our earnest attention. Our concern here today, however, lies more particularly in the level and trend of unemployment and how this is being influenced by automation.

What in essence are the problems we face after many years of technological improvement? Certainly they are many. Here are a few of the more obvious ones.

1. The maintenance of a free society. I realize this suggests just the appropriate amount of involvement of government in our industrial activity to establish the right environment.
2. The spreading of the benefits of technological improvements to all people. This does not mean to all people in this country alone but eventually to the people of all nations of the world.
3. The avoidance of hardship and injustice which may result from the adjustment to new conditions arising from automation. This involves the whole broad question of unemployment.
4. The regulation in the interest of the public of certain of the activities of big business, big labour unions and big government to prevent the evils which do emerge from time to time because of power and perhaps selfishness.
5. The need for a constructive program which will satisfy all levels of society as to useful application of the increasing leisure hours which will be inevitable as automation advances.

6. The development of new technological improvements ahead to permit a finer life for all. This could involve better community planning, purification of air, reduction of water pollution, conservation of resources, providing adequate food for the hungry people in other countries.
7. The creation of an educational system which will enable our people to better understand this changing world and should equip them with the proper skills to play their useful part in it.

These are but a few of our problems and I know there are many more. I am not qualified to discuss them all — nor does the time permit this. I am convinced, however, that the solutions to these economic and social problems will only be formulated after a thorough re-appraisal of all of the following criteria:

1. our economic, social and political institutions with regard to their flexibility in meeting the changing conditions;
2. our existing educational and information gathering facilities;
3. a rational assessment of the employables and the jobs available for them (this will require an inventory of the required machine skills versus human skills)
4. our existing and proposed retraining and relocating facilities; and finally
5. the systems of financial compensation for the unemployed and unemployables.

Above all, it is necessary to develop a long-range plan to enable us to continue to derive benefits from automation in building a good society. This will require a clear understanding of the fundamental economic and social implications of automation and the conducting of discussions on the problems and ramifications at informed levels, such as this Conference is sponsoring today.

It is natural that I should place education high on the list of criteria to be examined when we look for solutions. Automation and technological progress presuppose advancing levels of education in the labour force. It is true the 60,000 young Canadians currently entering the work force in Ontario each year will have had, on the average, more time in school than those who preceded them, but those already employed will have to be trained and retrained, educated and re-

educated just to meet the increasing demands of progress. It has been estimated that those who are educated and experienced may have to spend as much as one-third of their future time in self-education and improvement. A 10-year graduate of engineering will have to spend 10% of his time broadening his knowledge to remain even with current graduates.

I visualize today's society as being composed of five broad groups of individuals classified by their educational levels or degree of skill. First, there are those who, because of their brains, initiative and ingenuity can accept any environmental circumstance and rise to its challenge. They know what jobs are available and are capable of meeting the requirements. They accept these positions and stay in them until some new challenge impels them to change. Second, there are those almost as well endowed who only require the paths to new employment to be pointed out to them and they can readily follow through. The third group are those who generally have the mental and physical capabilities required but lack sufficient education to master the skills necessary to take their place in an automating world. The fourth is a very large group who may have neither the ability nor the education to cope with the technological progress. And fifth are the new incoming additions to the labour force who may lack experience and possibly the required educational standards.

The first two groups should present little or no problem, the third and fifth will have problems of education or retraining, and the fourth problems of unemployment.

To achieve an ever-increasing average level of education will require our society to solve complex psychological as well as economic problems. How, for instance, do we set about to instill in the under twenty age group a desire to stay on for more education, particularly when at this immature and impressionable age nothing appears to be more important than to satisfy, at an early date, their material wants? On the other hand, even the subsidized retraining programs sponsored by the various levels of government and in some instances industry have met with indifferent success. While I do not have any specific examples relating to our own province, the results of one dislocation and retraining instance in the United States will illustrate the point. This has to do with the 433 employees idled by the closing of a meat plant in that country. Only 170 applied for the company-sponsored and paid retraining program — 58 were found to be qualified for

retraining. Of the thirteen who completed one course, two found jobs for which they were retrained and the remainder became unemployed or were janitors, warehousemen, etc. I would hope that our own results may be more encouraging as time goes on. Certainly the management of the social problems resulting from automation will not be easy but surely it justifies our exerting substantial efforts to minimize hardship and frustration for those affected.

Steps must be undertaken in formulating the long-range plan, mentioned earlier, which will effectively increase the preparedness of the labour force in meeting the challenge of automation. Important among these steps will be the following:

1. Identify areas of work which can and will be performed best by human skills;
2. Analyze the skill requirements needed for the performance of that work;
3. Determine the best methods to be used in acquiring these skills; and
4. Educate and re-educate, train and retrain to keep the present and future labour force productive under the new conditions of automation.

Finally, there are many questions for which answers will have to be found as automation advances and to assure that the resulting changes in the economic, social and even political structure will be as orderly as possible. It might be helpful as a useful trigger for discussion at this or future meetings to mention just a few of the types of questions that come to mind on this whole matter. These are somewhat more specific in nature than the list of problems I mentioned earlier.

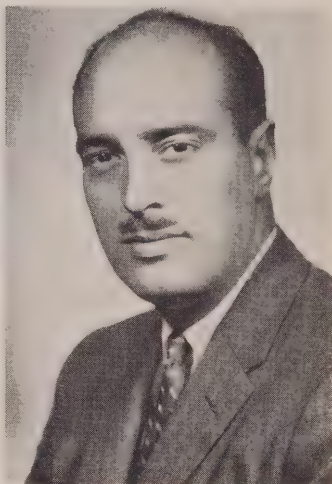
1. What can be done with those in the labour force who are not capable of being re-educated or retrained and for whom there are not enough unskilled jobs available? For example, can as much as 15% of the work force remain passively unemployed?
2. How do you maintain the effective purchasing power of the subsidized unemployed? Enforced idleness (albeit paid for) is degrading and demoralizing — sacrifice of human values and dignity should be avoided if at all possible.

3. What about the prospects of a national work program, i.e. parks, roads, utilities, construction of institutions, schools, hospitals, etc.?
4. Who can shoulder the load of providing for the facilities, staff and costs of the projected added educational program? Is the economy capable of assuming this task? Would it in the long run be less costly than to pay a given percentage of the population to be contentedly unemployed?
5. If the next ten years exhibit as much of an increase in automation as the last ten did over the preceding ten, will a degree of control and national planning be required which will radically change our concepts of the management of our economic and social system?
6. Will the tremendous organizational and administrative tasks involved require increased governmental participation — and how much is desirable?
7. On the international scene, what about the areas of chronic under-development which require foreign capital just to maintain their levels of subsistence? This capital now provided by the developed countries may have to be diverted to solving their own problems of unemployment and education.
8. What would be a practical percentage allocation of government funds to provide the needs of a continually effective education program, appropriate welfare service, etc.

I do think that our industrial society, in which we all fill an important part today, has reached a state of maturity which enables us to pool our wisdom, experience and judgment in finding a common solution to these problems. I know I speak for all manufacturers when I say that it is not our problem, or labour's, or the government's alone, but one of our entire society and the three bodies represented here today have a mutual responsibility. I have confidence, in the time ahead, with an intelligent, tolerant and unselfish approach we will be able to find the light we seek.

A Union Viewpoint by Kenneth J. Brown

Mr. Brown, a native of Toronto, is the international president of the Amalgamated Lithographers of America with headquarters in New York. His early experience was in Canada where he served his apprenticeship and then became the president of the Toronto local of the Amalgamated Lithographers in 1954. After having served a year as assistant to the international president, he was elected to his present position in February 1960.



At a conference which was recently held for the purpose of exploring possible solutions posed by the advent of automation, Mr. John Diebold, who coined the phrase, stated the following:

“We are today only seeing the tip of the iceberg. We haven’t even begun the transition and when it does begin, it won’t stop. It will be a continuing transition and it will go at a much faster rate because of the pressure of internal competition. Those who think automation means changing a few manufacturing industries don’t realize that it will affect everything. When machines begin to have voices and begin to talk to each other, that isn’t just a mere technological change.”

In this connection, you have undoubtedly heard about the machine which was taught to play a game of checkers and within a matter of hours, had stored sufficient information to enable it to easily defeat the men who made the machine.

Viewed at its worst, the next step in automation, cybernetics, will result not only in the elimination of any need for human physical effort but for mental effort as well. What do we do at that stage with the many millions whose physical or mental efforts, skills and abilities may no longer be needed?

The problems raised by automation are of a different character and a different order of magnitude than any that we have ever faced in our industrial society.

Even that part of the iceberg which we can see is sufficient to cause all of us to conclude that the most pressing economic problem of the next decade or two will be the problems which result from automation.

The social and political disruption which they can cause is frightening and solutions must therefore be found. The statistics for various industries affected by automation indicate that: during the period of 1947 to 1962, while the entire work force in the U.S. increased by approximately 10 million workers, 97% of such increase was in the white-collar field. In that entire 15 year period, the blue-collar occupations increased by 700,000, a figure which was only 3% higher than that recorded in 1947. But even the white-collar worker is now threatened by the new data processing machines and the development of machines with the ability to think.

In individual industries, the automobile industry in the U.S. produced 500,000 more cars in 1960 than in 1953 but there were 172,000 fewer jobs. In steel, the 1960 output was 9% less than that of 1953 but there were 19% fewer jobs.

In the meat packing industry alone, employment has dropped from 190,000 to 160,000 in a 5 year period, even though production has increased.

To take something which is even simpler to understand, the introduction of automatic elevators in New York City has resulted in the loss of 40,000 jobs. Automation and advanced technology have resulted in the loss of 200,000 industrial jobs per year, and 200,000 fewer farm jobs each year.

Nor is the picture in Canada significantly different. A recent survey of the automobile manufacturing industry indicates that for the period of 1948 to 1958, vehicle production increased 36.4%.

Total employment increased 7% but direct production labor, the blue-collar jobs, decreased 6.5%.

At the same time, the hours worked per week declined from 39.7 hours in 1948 to 38.3 hours in 1958.

Unemployment is high in the U.S. and is running at a rate in excess of 4% in Canada at this time, and for the past several years it has been in excess of 10% during the winter months.

In industry after industry, the picture is virtually the same — vastly increased production and either decreased employment or less than a proportionate increase in employment.

Some suggest that sufficient new jobs have been created in connection with the manufacture and servicing of the automated equipment to offset the displacement resulting from their introduction. There is no proof of this, however, and such statistics as do exist, imperfect as they may be, appear to suggest that automation has caused a significant decrease in employment.

The Secretary of Labor in the United States, Willard Wirtz, testified: "We have been assuming that the developing technology — what we call automation — will provide as many new jobs as it replaces. I say we have been assuming that. I am not sure it is right I assume we shall find those jobs because we must find the jobs."

I should also point out that such jobs will have to be found in a period of time when apparently fewer and fewer workers will be required while more and more are being produced. The tremendous numbers of young people now entering the labor market are the war babies of the early 1940's.

They are met with a need for application to their jobs of a degree of skill and education which many of them have not acquired.

The tens of thousands of high school dropouts have very little chance of finding gainful employment in the society in which we live.

What is the role of the trade union in this regard and how can it cope with the problems which have resulted from automation and technological advance?

The industry in which we work, the lithographic industry, has fortunately been one which has expanded far more rapidly than any

of the other printing trades. Our membership rose consistently but not nearly as rapidly as our increased productivity.

For example, in the 5 year period between 1958 and 1963, the value of lithographic products has virtually doubled from \$1.4 billion to \$2.7 billion. The work force, however, has increased by less than 15%.

We have been affected by the general advance of technology but the advances have been relatively slow and we have, in the past, been able to retrain our members to perform the new work which is required. Certain classifications have been eliminated entirely but new ones have replaced them. Unemployment has not been a very significant factor among our members up to now.

In most industries, automation not only eliminates the need for particular skills of individual workers. It eliminates the occupation completely.

I recently had occasion to watch the loading of a vessel with a cargo of sugar in Hawaii. This job used to be accomplished by 250 workers carrying 150 bags of sugar on to the vessel. The job is now done by 13 men, some sitting at a console, directing a stream of sugar on to the vessel.

The occupation, therefore, for 237 workers has been eliminated completely. There is neither a need for their skills, nor is there any job left for them to fulfil in this industry.

In lithography, when the hand transferers' occupation was eliminated, we retrained these people on the job to perform photo plate-making. The detacher, whose occupation is now threatened by the advent of the Klischograph and other color scanners, is now being retrained to perform stripping. The art which he practises, however, is fast disappearing. As I say, we have been fortunate because we have been able to absorb those people whose occupations have been eliminated in other jobs in the industry.

Nevertheless, the convention which we concluded Friday, evidenced an increasing concern by our membership about the changes which are taking place, and an awareness of the need for coping with them more effectively.

The impact of electronics and electronic controls and printing devices are becoming more and more a factor in our industry and are eliminating some of the skills which man used to exercise.

The new advances affect not only lithographers but other printing trades as well, and lines of distinction between crafts are being eliminated. This inevitably leads to increased jurisdictional squabbles between unions.

We moved last week on two fronts in connection with these matters. First, the convention delegates voted to establish an Educational and Training Program which would concern itself not only with the training of apprentices but more importantly with the retraining of journeymen whose skills will no longer be required.

We anticipate that our union will spend several million dollars during the next decade in this endeavor. I might add that the need for this program was so obvious to our members that there were virtually no dissenting votes, even though the establishment of this program will result in a significant dues increase for our members.

Second, our convention voted to merge with the International Photo Engravers Union not only to avoid jurisdictional problems which may exist between us but in the hope that this will be the first of many steps which will lead to unity among the graphic arts unions and enable all of us to protect the workers in this industry in a far better way than any of us alone can do now.

I should like to dwell for a moment on the merger question, since I believe that the future will see mergers between many labor unions. It will become a matter of necessity that they do so to avoid expending their energies on determining whether the union whose people are being replaced by a machine should have jurisdiction of it, or whether the union whose members have been assigned the job should have jurisdiction of it, or whether some new union formed to organize workers who service and maintain these machines should have jurisdiction over the work.

Merger between unions will also become necessary to enable the unions, as viable organizations, to service the expanding needs of their memberships and to act more effectively in the face of the well-nigh overwhelming problems which automation will pose to them.

Both the unions and management in the industries concerned have sought ways to alleviate the economic hardships which have accompanied the advent of automation.

However, what we have done is not enough and further steps must be taken to make sure, in the words of President Kennedy, that this public blessing is not a private curse.

Virtually all unions have been concerned with job security and have adopted certain measures to ease the hardship for the individual worker who is displaced by automation or technical advances.

For example, in the meat packing industry, an agreement between Armour & Co. and the Packing House Workers negotiated in 1959 permits workers so affected to receive so-called technical adjustment pay or to transfer to another Armour plant where a vacancy may exist or to retrain or to take severance pay or retire. The retraining program has not met with any notable success.

In the automobile industry, the 1961 UAW agreement liberalized separation pay, provided moving allowances for workers who transferred to another plant, increased supplemental unemployment benefits and extended hospital, medical and surgical coverage for a year after layoff. For those workers who were too old to be retrained, provisions were made for retirement at age 60 without any substantial loss of pension benefits.

New solutions, however, are constantly sought. A novel one was the agreement concluded by the Steel Workers and Kaiser. "The Long-Range Share Plan" developed by Kaiser and the union provides that all of the savings resulting from automation, improvements in technique or efficiency in the use of time and materials, shall be shared $\frac{1}{3}$ by workers and $\frac{2}{3}$ by the company.

In addition, all workers are assured that they will not lose their jobs because of automation. Jobs which are eliminated are resulting in employees being transferred to a reserve labor pool and these workers will do such tasks as may be required of them. Normal attrition results in about an 8% reduction in the labor force, so this guarantee of employment is not an undue burden on the employer.

Significant amounts of monies have been saved and have been distributed.

The foregoing examples of steps which have been taken are defensive kinds of measures which do not result in any increased employment for workers in the industry affected. They merely ease the burden somewhat. Better answers are required than those which we have thus far devised to meet the needs of an expanding population, both in Canada and the U.S.

It has been estimated that in the U.S., 50,000 new jobs per week will have to be created in the next decade to absorb the entry of new workers and provide gainful employment for displaced workers.

Both unions and some enlightened management are making continuous efforts to face up to their responsibilities. This is evident from the fact that in many industries there are joint labor-management committees which meet on a regular basis between negotiations, to assess the problems of workers in the industry, and of the industry itself. It is hoped by this means, that more rational solutions will be arrived at in the course of negotiating new collective bargaining agreements and at the very least, that harmful strikes will be eliminated.

For the past year, we have had more or less regular meetings with the employers in the industry and our negotiations in 1963 were concluded without a single major strike in any of the major cities where new contracts were negotiated. This of course was a hopeful sign and I would hope that it will enable us to move intelligently to meet our problems.

None of us can afford, nor do any of us want, to solve our problems on the picket line. It is too late in the day for that. What I have said about the relations between our union and management in the U.S. cannot unfortunately be said about the relations between our union and employers in Canada.

It is evident that greater cooperation and greater planning is required of industry and trade unions.

William Dodge, executive vice-president of the Canadian Labour Congress has recently observed as follows:

"As a nation, we are facing these choices: to plan our economic activity or to stand by the laissez-faire attitudes of the past; to accept labor-management cooperation as an instrument of planning or to reaffirm the class approach to labor-management relations of a half

century ago. I think the real question is: 'Are we ready to make these choices?' I think that labor is ready".

I would hope that management is ready to plan and is ready to work with trade unions on a broad scale to face up to the problems which confront us. For the future, the unions can be expected to urge measures which they believe will not only help the worker who is hurt but provide him with a job as well.

Thus, you have the concept of a 13 weeks vacation for long-time employees in the steel industry. In the lithographic industry, we have fought for and enjoy a 35 hour work week. Other unions will push for a reduction in the 40 hour work week which they have. These, of course, are all designed to provide employment for a larger number of workers.

At our convention last week, a resolution was introduced urging that we espouse for our industry a 30 hour work week but this was referred to our executive for further study. It is significant, however, that such a resolution was suggested and was indicative of the growing awareness of unemployment problems which may loom on the horizon, even in the expanding lithographic industry.

We do not argue that a shorter work week will, in the final analysis, prove to be a panacea for all of our ills. We do say, however, that unless somebody comes up with a better solution the unions will continue to urge that a shorter work week be established both as union policy and as national policy, as embodied in the laws of our countries.

A great deal is said about labor mobility, principally the lack of labor mobility, as a factor which tends to increase the hardships resulting from displacement caused by automation. It is quite common, that an employer who automates a plant will not automate the old plant which he has operated for many years, but will rather create a new plant in a new location and put the automated equipment at the latter location. The result in individual communities so affected is enormous and hard pockets of unemployment may result if the workers who become unemployed are not retrained for other jobs or do not move to some other community. Is industry ready, however, to permit such workers to move to the new plants with all their acquired security or to move to some other company in the same industry taking with them the pension, health and welfare and

other economic benefits which they may have achieved? Is industry prepared to move from the local level of the individual company and the individual union to a broader base on a national level to help assure greater labor mobility?

Much more than the efforts of individual unions or companies, however, is required and the role of the government can hardly be minimized. While individual companies and individual unions may take certain measures to ease the burdens resulting from automation, the economy as a whole will suffer and suffer greatly from persistent unemployment resulting in reduced purchasing power and thus reduced gross national product.

The government therefore must take a much more active role in encouraging full employment through tax measures and financial incentives, must develop effective retraining programs for displaced workers, must provide allowances for workers who must either relocate or remain for extended periods of time without work, must provide increased educational opportunities for all of our children because it becomes increasingly clear that the role of the unskilled worker in our society has virtually disappeared.

But government, unfortunately, is only beginning to become aware of the problems which exist. In Canada, the problems posed by automation and technological advance are likely to hit harder than they have elsewhere on the continent. The introduction of such equipment has not been gradual as it has been in the United States and perhaps its weight has not been felt in Canada to any significant extent. But come it will, and as with so many developments in Canada, they will be introduced here, full blown, after years of development in the United States. The impact will be greater, the period for adjustment shorter, the hardships more aggravating. Canada must begin to anticipate the difficulties while there may yet be time to devise appropriate means to deal with them.

The lack of governmental reaction to the advent of automation is perhaps best evidenced by the fact that even in the United States the President only last month appointed a Commission on Automation to identify the problems which will result from automation in the next ten years and to "pioneer in the social, political and economic aspects of automation to the same extent that science and industry have pioneered in its physical aspects".

The formula is an excellent one and we must all have the courage and the foresight and wisdom to seek solutions to what is, and will continue to be, one of the most pressing problems of our time.

It is interesting that studies are only now beginning to be made about technological unemployment and about the impact which it has already had. We are just beginning to study who is unemployed, where they are, what industries have been affected, for what reasons, what skills have been completely displaced, what potential skills do displaced workers have to perform the work which the future requires? We need to know more about the problem and it behooves us all — labor, management and government to attack this problem with great imagination.

The human slag heap of technological discards is mounting and failure to find a solution will cause many to doubt the wisdom of the advance.

I should like to add one further dimension to the discussion on the problems resulting from automation. It appears to me that in a world where more than half of its people are ill-clothed, ill-housed and ill-fed, that our fantastic productivity be not looked upon as a curse which results in unemployment but rather as a blessing which brings an opportunity for full employment at home for the benefit both of our own people, and for that part of the world which needs our products so greatly.

Our horizons are unduly narrow. Our reach must exceed our grasp and we must seek a more prosperous and better life for all mankind. Perhaps in this way, we will be able to create the job opportunities and enjoy the fuller, more leisurely life which automation makes possible.

Just last week I received a letter from Walther Reuther in which he said that we are living in an age "when the pace of technology currently exceeds man's ability to cope with the problems it creates; when the emerging nations of the world are creating the revolution of the 20th Century; when the ultimate destiny of the world's people lies in the wisdom of men to harness the atom for peace and not for a war of total annihilation; when poverty, hunger and disease can be overcome if only man learns to use the tools already at hand; when the ugly stain of discrimination against fellow men is finally being challenged in every corner of the nation — in such an age, labor's historic

role as the moral and ethical conscience of society in achieving social justice must be made clear and unmistakable.”

I say that the moral and ethical conscience of all of us must be awakened so that together — labor, management, and government — we may jointly seek and find decent and workable solutions to the pressing problems of our times. We cannot fail in this task — none of us can afford to do so.

IMPACT OF TECHNOLOGICAL CHANGE ON LABOUR MANAGEMENT RELATIONS

by PROFESSOR JOHN T. DUNLOP

Professor and head of the department of economics at Harvard University, Dr. Dunlop was born in California in 1914 and educated at the University of California. From 1945 to 1947 he was controller of the Office of Economic Stabilization and from 1948 to 1957 was chairman of the National Joint Board for Settlement of Jurisdictional Disputes in the Construction Industry. He has written three books on labour matters and is a member of the Academy of Arts and Sciences.



Thank you very much Mr. Chairman. I want to express my deep appreciation for being asked to participate in your program. The subject that we have to talk about this morning is controversial. I want to start by suggesting that it is very difficult to speak with any confidence on this subject. I would like to introduce a note of humility about our subject. Also, there are always pluses and minuses, some unemployment and some new jobs, some benefits and some costs; it is very easy for people looking at a hippopotamus only to see part of the hulk.

In order to underscore how bad estimates on this problem have been in the past, let me refer to a couple of more popular predictions of the past. A speaker in 1896 before the British Association for the

Advancement of Science in estimating the impact of the automobile said that the horseless carriage could not be widely used, because it required great skill inasmuch as the driver has not the advantage of the intelligence of the horse in shaping his path. Such failure is international. About ten years later, with the advantage of ten years of experience, the Mayor of Cincinnati declared that the driving of an automobile requires such qualifications that no woman is physically fit to undertake the task.

More seriously, one ought to go back now and then and read what Karl Marx had to say about the subject in the chapter on machinery, Chapter 15, Volume 1, of *Capital*. On what was then modern machinery he said, "The workman becomes an appendage of the machine and it is only the most simple, the most monotonous and most easily acquired knack that is required of him . . . Hence, in the place of the hierarchy of specialized workmen that characterized manufacture, there steps, in the automatic factory, a tendency to equalize and reduce to one and the same level every kind of work that has to be done by the minders of machines. . . . The more modern industry becomes, the more is the labour of men superseded by that of women. . . . The various interests and conditions of life within the ranks of the proletariat are more and more equalized, in proportion as machinery obliterates all distinctions of labour, and nearly everywhere reduces wages to the same low level . . . The essential division is into workmen who are actually employed on the machines (among those are included a few who look after the engine) and into mere attendants almost exclusively children of these workmen . . ." Marx goes on "... Machinery is the surest means of lengthening the working day".

Ricardo changed his mind on the subject of machinery. In the revision of Chapter 31 of his *Principles* he switched his emphasis, conceding the possibility of adverse effects on workmen from the introduction of machinery.

I have referred to past views in order to introduce an element of caution, humility and tentativeness in the way in which we today approach this problem.

I would like to make two or three other introductory comments before turning to the heart of my topic. I am a little bit taken back this morning by the suggestion that I am to estimate the impact of technological change. In the wisdom of your program arrangers, I

note that this meeting is being held appropriately in the crystal ball room.

1. I want to introduce the note at the outset, that technological change does not act alone. Technological developments interact in an almost inseparable way with competition. Our topic really ought to be **THE IMPACT OF TECHNOLOGICAL CHANGE AND COMPETITIVE CONDITIONS UPON LABOUR AND MANAGEMENT RELATIONS** because one without the other seldom arises.

Let me illustrate the point by the development of the synthetic fibre industry which adversely affects the cotton or wool industry. What difference does it make if a man in the cotton textile industry is displaced or has his wages cut by the introduction of a new loom or some other technology that takes place within one plant as compared to the same effect produced by the growth of synthetic fibre competition outside of the cotton textile industry? It is really technological change operating through the market that is the important case. You see this in many of the container fields with competition among glass and cans and plastic and so forth. Technological change seldom operates alone; it is normally intertwined with competition. I should have brought along a clipping to illustrate this point which reports that the bartenders in the city of Detroit have been very concerned that their employment was going down by virtue of the employment of girls dressed up as bunnies and other forms in the bars and after hours clubs. Now those bartenders were affected adversely by a form of technological change and it may be just as real to them as machinery. Another example that comes to mind is the recent complaint of the barbers and hairdressers about the growth in the use of women's wigs which has seriously affected some enterprises in that industry.

I want to suggest that we get away from thinking of technology purely in terms of machinery or purely in terms of automation and adopt the much larger concept of technological change in the sense of the economist who speaks of a new production function and who recognizes that many changes exert their influence primarily through the market rather than in the immediate plant where technology is changed.

2. Your program makers again in their wisdom have talked about the impact of technological change on labour-management

ment relations. They asked me, as I shall, to focus upon one direction of the interaction. But I would like to suggest that there is the converse relationship which for some purposes is equally important — namely — the impact of labour-management relations on technological change. I shall on this point be dogmatic and violate the spirit of my introductory comment. In contrast to a great deal of popular discussion of the problem, it is my judgment that collective bargaining has speeded up substantially the rate of technological change in Western society rather than being an impediment to it, on balance. The rate of technological change is not really given for our problem. Technological change is itself shaped by labour-management relations in a number of ways.

I now turn with your permission to four major points that I want to make this morning, or to four areas of impact of technological change on labour-management relations.

I

The first of these is the impact upon the content of collective bargaining and the collective bargaining process itself. We tend these days to treat technological change as something new in the history of collective bargaining. Nothing could be further from the truth. It is useful to go back and review the way in which parties in the past dealt with a number of fundamental technological changes, for instance, the introduction of the linotype machine in the printing industry at the turn of the century, or the Owens machines in the glass bottle industry a little later, and the mechanization of cigar making or the coal mines. The collective bargaining process has always had to deal with technological change and has had new problems to confront. The confrontation of the problems created by technological change has influenced many provisions of collective bargaining agreements. It has affected a number of working conditions such as safety, hours of work through shifts in continuous processes, methods of wage payment and job content, in some instances increasing the value of a job while in other cases decreasing it. While these subjects are not new in collective bargaining, there are some new features in our present scene. For example, the growth of automation funds in a number of industries such as the West Coast longshore operations is a new emphasis in collective bargaining. You will excuse a reference

to a volume of six or seven of these automation funds by my colleague from the Harvard Business School, Professor Thomas Kennedy.

The impact of technological change on the content of collective bargaining can be illustrated in the steel industry by the effects on the internal wage structure and the job evaluation plan developed in the United States jointly by the Steel Workers Union and by the basic steel companies. If you compare this jointly negotiated plan, called the CWS program, with the metal trades plan of the early part of this century you will find that the relative importance or weight of the factor skill has declined. The introduction of more technological change and the nature of these changes has led the parties to downgrade relatively the role of skill in their job evaluation plan and to upgrade the significance of responsibility. There are very cogent reasons for this shift. The technological change characteristic of modern industry places greater emphasis upon the factor of responsibility, the high value of equipment, the importance of continuous operations, the possibility of large losses from negligence, and as a result, the parties in collective bargaining have adjusted the factors in relative wage setting to such changes.

Thus, technological change has historically caused an increase in the number of problems for the parties, affecting the wage structure and methods of wage payment, displacement, seniority and transfers, and a host of other subjects. I would emphasize at this point the continuity of technological change rather than the dissimilarity of recent developments or any sharp break with the past.

A further impact of technological change on the collective bargaining process itself has to do with the strike as an instrument of dispute settlement. We have had a number of vivid instances in recent years in which it appears that the strike may no longer be as effective an instrument as in the past. I think of continuous process industries such as oil refineries, power plants and automated industries in which a supervisory staff has been able to run a plant for a number of months without the bargaining unit work force at all. I think of a strike in a chemical plant in the Pittsburgh area that went some nine months. Management was able to run the plant without the normal maintenance and production work force by working supervisors extra hours and by use of its technical staff. There is no doubt that, in certain sectors of our economy, the strike as a weapon in the bargaining process has been affected by the character of technological change.

This development compels one to reflect on the assumption, which a great many of us have always made, that collective bargaining and the strike are mutually interdependent and cannot be disassociated. Let there be no mistake, I very much defend the right to strike and believe that it has performed a real role in many collective bargaining situations. But here I'm talking about places in which people on both sides sooner or later come to the conclusion that the strike may not be an effective instrument to promote settlements. I do not believe that the strike is an all-purpose weapon equally applicable to all situations.

We have been extending the collective bargaining processes to government employees in recent years in our country. In your country among fire fighting employees collective bargaining agreements cover a great many fire fighters. In these sensitive areas, often as a condition of bargaining, the parties themselves have renounced the right to strike or lockout. Can anyone say that there cannot be genuine collective bargaining in these situations because there is no strike? That has often been assumed. But I have come increasingly to question that assumption. I would agree that if one were dealing with a sector of the economy where the right to use economic sanctions had been conventional, and then all of a sudden a statute sought to withdraw the use of the strike and lockout, that would be a very different situation with adverse effects upon bargaining. But in the sectors of our economy where the parties themselves come to recognize that economic sanctions may not be effective instruments of bargaining because of technology or public opinion, I'm not inclined to believe that collective bargaining in such circumstances is doomed or is impossible.

There are sectors of our economy in which the nature of technological change has enhanced the capacity and effectiveness of the strike to those who are strategically located — those who maintain the machinery or those who are critical to its operations.

My first major point this morning is to invite your attention to the impact of technological change on the bargaining process itself.

II

Technological change also has an impact on the structure of labour and management organizations. Let me turn to the labour

side first. An interesting article in the February 16, 1963 *London Economist* starts by saying that the best single thing that anyone could do today for the British economy would be to abolish craft unions. The article proceeds to develop, with special reference to the ship building and the newspaper industry in Great Britain, what it regards as adverse effects of craft unions upon collective bargaining and on the public weal.

There is a great deal of confusion on this problem. Technological change is definitely affecting the character of union structure in a very complicated way. It has enhanced the position of certain crafts; it has adversely affected others; it has changed the internal balance between crafts and skilled occupations on the one hand and the unskilled and semi-skilled on the other hand in industrial unions.

Your speaker yesterday afternoon, Mr. Kenneth Brown, of the Amalgamated Lithographers Union is from a union which is benefiting in employment and strategic position from the nature of technological changes in the printing industry.

Perhaps I can best illustrate the impact of technological change on union structure by taking a highly controversial subject. I refer to the problem of the fireman (helper) on diesel engines in the railroad industry. Now the diesel engine was a very important technological invention in the railroad industry. I would like to have you contrast the relative impact of that diesel engine upon two different groups of crafts; one is the boilermaker and the other is the fireman (helper). The same diesel engine which now has threatened, let me leave it that way, the position of the fireman virtually eliminated the boilermaker on the railroads. Incidentally, there used to be approximately the same number of boilermakers as firemen (helpers). In the United States the figure of 50,000 boilermakers who used to work on the railroads has been reduced to an insignificant figure of a couple of thousand.

Nobody heard much about the boilermakers' problems. Why? In the contrasting experience of these two crafts with the same technological change, I think we can learn a good deal. First, the boilermakers had a skill which had considerable transfer value. They left the railroads and went to shipyards, to construction operations, to boiler plants and the like. By contrast the job qualifications of the fireman appear to have no ready transfer value to other industries.

Second, the boilermakers' wages on the railroads, if anything, were relatively low as compared to the wages in these other industries. Many of them had stayed in the railroads partly out of custom and habit, and partly by virtue of generous pension arrangements on the railroads compared to other industries. When they transferred, they made the transition to other industries without too much difficulty. Transfers are not likely to be so readily made in the case of the fireman (helper). Can a man who has been earning eleven thousand dollars a year in our country get a job with similar pay with the qualifications and experience of a railroad fireman? Third, the Boilermakers Union has collective bargaining agreements and members in a whole host of other industries: in construction, in shipyards and in boiler manufacturing, etc., whereas the Firemen's Union, as most of the Railroad Unions, is exclusively confined to the railroad industry. This adaptation to technological change on the railroads therefore invokes not only the future of the craft of firemen (helpers) but also the future of a labour organization. Fourth, the boilermakers on the railroad had a relatively clear jurisdiction under their work rules which they shared with nobody else, whereas in the case of the Firemen they are rivals with the Engineers' Union. There are railroads in which the Firemen represent both the firemen and the engineers and there are other railroads on which bargaining rights are held by the Engineers for both the engineers and the firemen. Fifth, the firemen and the engineers represent different levels on a ladder of promotion, and the problems of the division of work opportunities on that single ladder of promotion over the years has been a most critical and difficult issue to put it mildly. On at least two occasions, agreements to merge these two railroad unions have floundered particularly on this issue of division of work opportunities.

We have examined the cases of two craft unions affected by the same technological change, one in which the adjustments were made without dispute and conflict; the second in which the most difficult of problems confront the parties and the community. I am not inclined to agree, frankly, with the simple and often expressed proposition implied by the *London Economist*, that a bargaining structure comprised of an industrial union has few problems of adjustment to technological change whereas craft unions create only the most difficult of problems. The whole history of technological change under collective bargaining would not support such a simple proposition.

Now let me turn briefly to the impact of technological change on the structure of management, because, in my opinion, technological change is having equal impacts upon management. This is a theme on which a book could be written and indeed on which books have been written. Technological change is affecting an old problem of all organizations, be they labour or management, of the degree of centralization and decentralization. Modern technology has vastly increased the capacity to centralize information quickly. Command over information is one of the vital ingredients of decision-making. I was reminded of this when I got up this morning in this hotel and looked out the window to the building across the street. Modern management of all sorts is able to secure vastly more information in more detail and more rapidly than previously. This compels a rethinking of the age-old problem of how much centralization and decentralization there should be in decision-making in management.

Technological change is also having an important effect upon the type of business executive who is likely to be successful in the future. This, in turn, affects the recruitment and training of executives. I am a little bit concerned about this frankly, for a premium is likely to be placed upon the man who superficially, at least, masters the modern technology, who can speak its lingo, who feels at home with the computer and who impresses others with his mastery of the technology. There remain many other requirements for the successful modern business executive.

III

Technological change also has important effects upon the substance of bargaining and the substance of labour-management relations. I pick one area out of a full range that could be discussed; in the limited time it is possible to highlight only an illustration. One effect of modern technology is clearly to affect the method of wage payment. I submit that the traditional methods of incentive payments and piece work are being undermined by the developments of modern technology. I was rather interested, two years now, when it was my privilege to run a conference comprised of twenty economists from the Soviet Union and Eastern European countries and twenty economists from the United States, Great Britain and Western Europe, on the subject of labour productivity. Among the subjects on which there was a high degree of agreement was the effects of technology on methods

of wage payment at the plant level. I had thought the Russians were entirely ideological about the subject of incentive payments and that all workers should be on an incentive basis of pay of some type because it conformed to the ideology. But the Soviet delegates were very clear in saying that they had begun to abandon such methods of wage payment in many sectors because modern technology did not lend itself to the traditional methods of piece work and incentive payments.

While there are some exceptions to this consequence of technological change, the main thrust of the direction of technological change is to render obsolete and inoperative the traditional methods of individual or group incentives. This is true in part because of the rapid rate of change. One does not put a new machine into a plant and then leave it alone for years. One is continuously introducing change. Anyone who has had experience with setting incentive rates knows that often the parties are engaged in a variety of games or battles between industrial engineers on the one hand and the not inconsiderable talents of the ordinary guy who knows how to beat the system. When thirty or forty million dollars of equipment is being used less effectively than it might be while somebody plays a game for a year over the specific incentive rate applicable to a job, the game becomes a very expensive process of wage setting.

I happen to be one of the three public members of the Kaiser Steel-Steelworkers Committee, and we had a meeting only yesterday in Los Angeles. What has not always been recognized in the public discussions of the work of this Committee, is that one of the major objectives of the plan is to replace gradually the traditional system of incentives in the Kaiser Company, a system that has prevailed in the basic steel industry for over a hundred years.

It should also be noted that the methods of wage payment are perhaps being affected not merely because of the frequency of technical change but also because of the complexity of incentive systems under modern methods. I don't know if any of you have picked up a manual which specifies the calculation of incentive pay on a job. When you get a booklet that is so thick with all kinds of complicated formulas to determine the pay of the ordinary guy one begins to question how effective such a method can be in motivating his efforts and in producing results and reducing costs as well.

What has been discussed with respect to methods of wage payment could also be developed with respect to the characteristics of the work force, standards for promotion, relative wage differentials and a host of other provisions of agreements.

IV

The final impact of technological change which I shall refer to concerns the internal labour market. Economists have tended to concentrate on the external labour market the movements of workers between enterprises. But there is a vast world of the internal labour market, the movement of men from one job to another within the same plant or same bargaining unit and these movements are decisively affected by collective bargaining. This is a range of problems in which I think collective bargaining has much to contribute in the future and which also influences the rate, nature and consequences of technological change. There are too many collective bargaining relationships in which seniority districts are so narrow that employees of fifteen and twenty years' service are being laid off in one district, while new men are being hired off the street in the next door district. It is imperative that all of us give greater attention to the problems created by technological change for internal labour markets. This topic includes the problems of movements between plants of the same company, even between different companies in the same locality in a relatively homogeneous industry and of course includes transfers among different seniority districts of the same plant. These problems are particularly acute with plant shutdowns or contractions of departments.

It is my view that technological change is certain to affect the appropriate seniority districts with increasing frequency. We have far too many cases in which there is very uneconomical use of our labour supply because some people are being hired off the market, when others of long seniority are being laid off. I recognize the very great difficulty of integrating seniority districts. There are, however, an interesting number of contracts which are providing for interplant transfers of seniority rights under conditions of plant closings or under conditions of technological change.

I happened to arbitrate under an agreement covering almost thirty glass bottle plants east of the Mississippi river. There is a

limited form of interplant seniority. In the automobile industry, there are some such provisions particularly in the Detroit area. I suspect that as technological change affects particular groups of employees and plants it leads to an increased number of plant closings. These developments tend to require the parties substantially to rewrite a number of their rules relating to the internal labour market.

So much for these four types of impact of technological change: the impact on the bargaining process itself; upon the structure of labour and management organizations; upon the methods of wage payment and upon internal labour markets. These are but a few of a long list of topics we might have considered.

In conclusion, I would stress the importance of the procedures by which the parties confront technological change. A great deal of the impact of technological change depends upon the way in which the parties approach it. If we have learned anything about technological change, it is that the parties need to sit down outside the normal contract negotiations process to study technological change and to study its effects in the particular situation. We are learning that anticipated rates of technological change will require a great deal more attention to the adaptability of the work force. We need in both our countries a vastly more flexible work force so men and women look forward no longer to a single job in their lifetime but are adaptable to a number of different jobs. They do not receive their training once and for all, but are trained continuously. I am attracted to the idea that even professional people, or perhaps one should say particularly professional people, should not be given a licence to practise for a lifetime. They should be issued a licence for only five or seven years after which they ought to show that they have learned new developments. At the rate of change we are experiencing, the same principle applies to the ordinary man working in a plant today regardless of his craft and regardless of his occupation.

I return in closing these remarks to the converse of the topic assigned to me, to the impact of collective bargaining and labour-management relations on technological change in our society. The ways in which both the gains and the costs of technological change are shared will affect the rate at which technological change can be practically introduced. I emphasize both directions of the interaction between technological change and industrial relations. Collective bargaining is increasingly seeking to share more broadly the costs of

technological change, even as in the past century the gains have been widely distributed throughout our society. The consequences of technological change depend in part on the ways in which labour and management in collective bargaining improve their procedures to study technological changes in advance, make the labour force more adaptable and versatile and share more widely than in the past the costs of technological change.

Thank you Mr. Chairman.

PANEL: THE IMPACT OF AUTOMATION ON LABOUR MANAGEMENT RELATIONS IN CANADA

A Management Viewpoint by P. M. DRAPER



A member of the Ontario bar, Mr. Draper is vice-president of administration for Canada Iron Foundries Limited. He was born in Ottawa and attended McGill University before taking law at Osgoode Hall. Vice-president of the Technical Service Council, he was for seven years a member of the Ontario Labour Relations Board and is immediate past chairman of the Industrial Relations Committee of the Canadian Manufacturers' Association.

The most frequently held views of automation appear to be one, that it is diabolical, two, that it is celestial. To some it means anything that increases productivity; to others anything that increases unemployment. James R. Bright, of Harvard, has said that few words have been so twisted to suit a multitude of purposes and phobias. Yet we must succeed in looking calmly at automation, we must not be intimidated by it, if we are to make it a successful means to desirable ends.

There is agreement that automation is essential to the attainment of our economic and social goals; that it is not only inevitable, it is imperative. There have been enough examples to demonstrate both the futility of trying to prevent automation and the fallacy of not

automating. There is agreement, too, that the human consequences of automation must not be neglected. How much significance these salutary views have emerges only when the attempt is made to put them into practice. Having voiced them, we are still faced with the stern reality that we cannot have everything and that hard choices have to be made and acceptable balances struck, for example, between the need for automation to achieve economic growth and the social costs of change; and between the need for some degree of government intervention in labour-management relations and the value of an independent industrial relations system based on freedom and responsibility.

Thomas J. Watson, president of IBM recently wrote: "We can't argue that technological change and automation are not labor-saving devices. Of course they are. They do cause displacement of people. In fact to do so is one of their major purposes. They may also upgrade people or increase the prosperity of an industry so that more are employed.

There are three main approaches that we might take toward handling technological change and the unemployment it creates: (1) Retard it, and spare ourselves the pain of adjusting to it. (2) Let it come on, and take the benefit of it in increased leisure, spreading employment around by adopting a shorter work week. (3) Accept it fully, push it ahead with vigor, and exploit its benefits while controlling its hazards."

A G.E. statement on automation declares: "Management has an obligation to:

1. Insist upon technological progress, including automation.
2. Preplan the human side of automation as well as the technical side.
3. Assist employees displaced by automation, before they are displaced, to improve their occupational or geographical mobility.
4. Educate employees in the benefits of automation and help them to recognize the opportunities it creates."

Labour has not hesitated to state its approval in principle of automation. A few years ago the statement appeared in a CLC labour

research bulletin that "Every responsible trade unionist recognizes that automation can confer immense benefits". General Motors and the U.A.W. are co-authors of the statement that "to produce more with the same amount of human effort is a sound economic and social objective". An article recently reproduced in "Canadian Labour" from the British Trades Union Congress publication "Labour" said, in part: "accelerating economic and industrial change, involving the contraction of some industries and the expansion of others, inevitably brings its measure of redundancy among workers. The human and economic problems of those who will from time to time be redundant is one of the concomitants of growth. Basically, this problem derives from the fact that, to maintain a high level of employment and rising living standards, it is necessary to have an expanding economy making use of the most up-to-date techniques and processes to produce the kind of goods and services required by changing demands both in domestic and overseas markets. This inevitably involves new patterns of employment."

Since labour and management agree generally on the necessity of automation, it would seem reasonable to suppose that they would be collaborators in facilitating its introduction. The possible major goals of labour and management do not appear, on the surface at any rate, to be in conflict. Management wishes to gain union and employee cooperation in the installation and operation of new equipment and processes. It may fairly be said that labour and management could agree on the goals of sharing the gains of automation, providing greater job and income security and compensating for the loss of jobs. The only possible goal of labour on which there could be no meeting of minds would be that of obstructing or preventing automation. However, as the record shows, the general is not easily translated to the specific.

Traditionally, unions have first concerned themselves with union recognition and security. Later, the emphasis has changed to wages and related monetary objectives. Today, in the face of the real or fancied threat of automation, union attention is being directed to job security. A year or two ago the IAM Executive Council recommended an 8-point collective bargaining program to deal with the problems of automation in general. This program calls for: (1) advance notice and consultation whenever employers plan major changes; (2) the right to transfer not only to other jobs within a plant but to

jobs in other plants as well, with adequate moving allowances (covering, among other things, necessary living expenses and losses resulting from the sale of homes); (3) training for new jobs (or for old jobs which have not been eliminated) at full pay and no expense to the worker; (4) preservation of the previous rates of pay of workers who have been downgraded as well as the preservation of a substantial part of the income of those who have been laid off (either through supplemental unemployment benefits, severance payments or some other device); (5) provision for early retirement with assurance of an adequate pension; (6) continuation of insurance coverage and other fringe benefits during periods of layoffs; (7) negotiation of new job classifications and rates of pay whenever automation has increased skill requirements or responsibility or imposed additional demands upon the worker in other ways; and (8) equitable distribution of the gains resulting from greater productivity through general wage increases, more leisure time or in some other socially desirable fashion.

There already exist many "private social security systems" designed to provide continuity of employment and equity of treatment. Where such systems stand in the way of increased productive efficiency (and of labour adaptation and mobility) efforts must be made to modify them while avoiding, as far as possible, resultant disadvantage to employees. Continuous improvement of operating efficiency should be a common objective of labour and management. But although, historically, job opportunities have increased as technology has improved, assurances of long-term increases in the number of jobs are of small comfort to those adversely affected here and now.

Automation can have direct and immediate effects on jobs. It may eliminate whole jobs or parts of jobs; it may require new combinations of skills; it may affect responsibilities and a wide range of working conditions. Automation is most readily introduced where flexible job classification and transfer provisions exist; where it encounters rigid job lines and similar restrictions, labour-management conflict inevitably ensues. Workers generally want jobs, not compensation in lieu of jobs. This is also a more desirable course for management than payments to displaced employees or the continuation of make-work jobs.

Undoubtedly there will be increasing emphasis upon non-wage benefits intended to protect employees against the short-term adverse

effects of automation. These will take the form either of alternative employment for affected employees (by abolition of jobs through attrition, transfers to existing jobs, re-training for new jobs) or of compensation for loss of employment (by severance pay, supplementary unemployment benefits, early retirement). In the consideration of any such proposals, the principle should be maintained that the purpose is to protect the employee, not to preserve the job. To the extent that the number of jobs is fixed, automation is impeded and the potential gains from it are diminished. Management cannot accept the obligations to persons not its employees that are implicit in job guarantees. The primary objective must be to facilitate automation. The key requirement then becomes appropriate means of adaptation to the necessary changes.

Attitudes towards automation appear to depend on the ability of the individual to adapt to change and on the skill with which the change is managed. The preliminary steps taken during a period of transition to automation can play a vital role in the success or failure of the automation program. For obvious reasons a smooth transition is more likely to be made if employees and their union are given advance notice and explanations of impending automation and this will become a more common practice of managements and a more frequent bargaining objective of unions. Labour-management consultation is widely endorsed in principle but often resisted in practice by either or both of the parties. Management may feel it implies a willingness to surrender authority and responsibility or may not be prepared to disclose operating plans. Unions may see no purpose in consultation without a role in decision-making or may be reluctant to associate themselves with plans that may be to the disadvantage of union members.

The purpose of advance notice and consultation is to inform. Decisions concerning the introduction of new machines, equipment and processes are the responsibility of management, which is accountable for the success or failure of the enterprise. Consultation must not be seen by the union as a device through which to oppose automation. Advance notice gives affected employees the opportunity to look for other jobs and to plan their financial affairs with knowledge of what lies ahead. Consultation gives the union the opportunity of cooperating to meet transitional problems and thus contribute to orderly change and to the morale of the labour force.

Automation has stimulated some novel approaches to industrial relations in the United States. I have in mind such instances as the American Motors and the Kaiser Steel progress-sharing plans, the Armour automation committee, the West Coast longshoremen's fund, the steel industry human relations committees and the automobile industry joint study groups. The latter two are examples of continuing labour-management committees, with or without neutral members, established to study the effects of automation on employment within a company or an industry and to consider ways of alleviating them. They are effective largely because they operate away from the emotional atmosphere of negotiations.

In a recent article, John T. Dunlop, of Harvard, wrote: "One of the central areas of the impact of automation is collective bargaining. The relation is one of mutual interaction. Collective bargaining affects the rate of change, and change also constitutes an increasingly significant subject in a variety of ways for the parties to collective bargaining and to the government as it seeks to influence the environment of the parties." He went on to pose these questions: "Does collective bargaining enhance or retard automation? How does it balance personal and social costs against the gains of automation? How does it reconcile the interests, which may not be identical, of the management, the workers and the union in automation? What price are we willing to pay for efficiency? How can the institutions of collective bargaining be better adapted to meet these problems in the public interest?"

In many industries, collective bargaining is producing solutions to the problems of automation, some effective, others mere makeshifts; few, perhaps, good enough for the long run. Nevertheless, they provide useful material for study and, more importantly, give proof of the resilience and the potential of the institution.

To the extent that management and labour succeed in working out the problems of automation through collective bargaining, the impact of automation on labour-management relations will be diminished. While, therefore, it is important to recognize the limitations of collective bargaining, it is equally important to appreciate the contribution it can make.

So far in Canada automation, whatever its other effects, has not had substantial impact on collective bargaining nor has it yet become

a matter of major concern to either labour or management. This is presumably because the type of automation currently taking place is still primarily the introduction of individual labour-saving devices. The spread of automation in its more sophisticated forms is still to come. There has been a shift by unions away from high wage demands and towards a combination of lower (or no) wage demands and a variety of job security measures. It should be noted, however, that the latter have not always been sought because of impending automation, but have often reflected union bargaining strategy in the face of growing employer resistance to rapidly increasing wages.

The incidence of collective agreement provisions negotiated because of automation is low. A Federal Department of Labour study of agreements in effect in 1962, covering 361 manufacturing establishments employing 274,660 workers, found that guaranteed employment or earnings provisions existed in 20 establishments, one being an annual guarantee and the remainder being weekly guarantees; that severance pay plans existed in 19 establishments; and that supplementary unemployment benefit plans (with or without severance pay features) existed in 46 establishments. It is highly likely that some of these provisions and many others contained in collective agreements were not negotiated with automation specifically in mind. But whatever their original purpose they would presumably be applicable to situations created by automation.

There are two well-known arrangements, both involving the Canadian railways, which stemmed directly from automation. The 1958 agreement between the Canadian Pacific Railway and the firemen's union provided that yard and freight firemen with less than two years of seniority would be laid off. However, they were to be given preference for other employment and, if they remained in employment, were to be given preference over new applicants for employment as passenger firemen, if they remained qualified. The Canadian National has a similar agreement. A significant settlement was reached in 1962 by the Canadian railways and the non-operating unions. It provided for a job security fund financed by a one cent per hour employer contribution to be used to mitigate, in ways to be negotiated by the parties, the problems faced by long-service employees whose jobs are eliminated by automation. It may, for example, be used for re-training or re-locating employees, or to provide severance pay or supplementary unemployment benefits.

The common experience of industrialized nations has been that total employment has increased steadily to provide jobs, both for those displaced by technological advances and for the constantly increasing labour force. It is not possible on the basis of current experience to predict what the long-term effects of automation in Canada will be, nor to suggest specific solutions to the short-term problems it raises.

What is clear is the need for continuous efforts to prepare a sound basis for effective future action. A wide range of studies is indicated: studies of the overall progress of automation; of the introduction of automation and its effects in each industry; of changes in manpower requirements and in productivity; of modifications in systems of payment, in hours and in other working conditions; of the experience of displaced workers; of changes in social relationships at the work place, in plant organization and in line and staff relationships.

The study of such problems should be based on long-term objective research, conducted by qualified neutral agencies and some, perhaps, even by labour and management themselves. Industrial relations research has largely been the collection of data that will support a fixed position or a desired result. We are in need of research having as its purpose the objective appraisal of facts to assist in solving problems and setting long-term goals rather than rationalizing bargaining demands.

Since 1956, the Federal Department of Labour has undertaken important research on the manpower implications of automation. It is of interest to note that for the purpose of the studies automation has been broadly defined and has been classified into eight types: (1) new products; (2) changes in old products to increase their marketability or to make production easier and cheaper; (3) new materials; (4) new sources of power; (5) increased mechanization or automation of production processes; (6) changes in communication and other services; (7) the use of computing machines; and (8) changes in plant organization and layout. The department is now turning its attention to the labour-management relationship problems which accompany automation.

Both here and in the United States interesting but highly speculative projections of the probable effects of automation are being made but too few reports of actual experience are available. In fact we have

a mountain of words and a molehill of facts on the subject. Because there is as yet so little literature or research data on automation in Canada we are dangerously vulnerable to the unconfirmed views of the alarmists. As one instance, the relationship between automation and unemployment is little understood. It is all but impossible to identify unemployment attributable solely to automation. Yet efforts are made to blame automation which impede the search for basic solutions to unemployment problems. In the words of Paul A. Samuelson, of M.I.T., "The important question is not what put a man out of a job but why he can't find a new one."

Before we act, we must first know what needs doing; we must know what the problems are. Otherwise, we are merely tinkering with something we do not understand, and we cannot fail to do harm. We must then test the adequacy of existing measures and institutions. Having determined which of the attendant problems lend themselves to industrial relations solutions, we must discover and apply the specific solutions that are feasible in the circumstances.

On the one hand we hear the charge that our industrial relations system is neither adequate to the task nor appropriate to the times. On the other hand we hear heralded a new era of creative industrial relations. Like all extreme views, these are destructive, the one because it underrates the accomplishments of industrial relations, the other because it overstates the potential of industrial relations.

Critics of our industrial relations system invariably exaggerate existing problems, deprecate available institutions and espouse drastic solutions. Proponents ignore its limitations, repulse proposals for innovations and stimulate unrealistic public expectations.

The system is one with countervailing values and costs. It has many times proven its adaptability to change and it will certainly continue to change and to improve. It is at its best in resolving problems at the workplace between individual employers and their employees and this, consequently, is where responsibility for its successful conduct is greatest. Its limitations grow as the issues become more remote from the working relationship of labour and management.

The performance of the system is influenced by the total economic environment. Today, the issues surrounding displacement or anticipated displacement of workers, arising as they do in a cloudy economic setting, are making severe demands on the system. Industrial relations

is a much less difficult function when times are good, jobs are plentiful and wages are rising, than when the economy is slack, jobs are scarce and labour costs are under intense scrutiny. As United States Secretary of Labor Willard Wirtz has noted, "it is one thing to bargain about terms and conditions of employment and quite another to bargain about terms and conditions of unemployment."

Many of the issues raised by automation are familiar and existing industrial relations policies and practices and collective agreement provisions, though they were intended to serve other purposes are applicable and adequate. For example, filling vacancies and new jobs and making promotions from within has long been industrial relations policy in many companies. Increasingly prevalent is the policy of making employment stability an objective not only for the industrial relations function, by appropriate hiring, transfer, training, overtime and other practices, but also for such functions as production planning and control, equipment installation, inventory control and purchasing.

There will, of course, be the necessity of adaptation and extension of current approaches and the opportunity for improvisation and experimentation as there has always been. Versatility is always proof of vigour. We must not now become guilty of the resistance to change we decry in others, of failure to discard what has been found wanting and of reluctance to try what holds promise. Constructive change is the best answer to those who question the resources of our industrial relations system.

No one doubts that in the long run automation will have beneficial economic and social consequences. The problem will be in making the transition to automation with a minimum of dislocation and individual hardship.

Management's approach to the issue of automation is necessarily based upon accepted principles of business practice. Its responsibility is continuously to enhance the efficiency of the enterprise by whatever means are available to it. It believes that this responsibility must be accepted and supported by labour. It is a grave disservice to the enterprise and to its employees not to have the most efficient facilities the enterprise can afford. The enterprise that neglects automation represents both insecure employment and insecure investment.

Automation has broad industrial relations implications for management and labour alike. It presents problems and requires solutions that call for superior individual and collective performance. It imposes upon management the necessity of accepting ever-increasing responsibilities and assuming ever-greater risks; of regularly measuring its policies and practices against the demands of changing conditions; of preserving and performing its proper functions. Management must avoid industrial relations policies that will discourage the desire for improved performance amongst either managers or employees and so act as deterrents to change. They must be positive policies, not simple reactions to work situations or union pressures.

It hardly needs to be said that the establishment of a mature and constructive labour-management relationship is essential if change is to be made in both an efficient and a conscientious manner. There is a great deal of room for greater labour-management cooperation before either will be in any danger of abdicating its responsibilities. They must evolve a sense of common purpose, based upon the truth that mutual interests, not divergent views, are the relevant criteria for the conduct of their relationship. On management's part this requires a reasoned, consistent approach to industrial relations rather than an irrational, vacillating one; acceptance of the union and of its role as representative of the employees; and, not least, assertion of its determination to plan, organize, direct and control, that is, to manage the enterprise.

Canadian management cannot reject opportunities to increase productivity — technology is world-wide. It is in the national interest that industrial technology keep pace with that of other countries so that we can export to foreign markets and compete with imported goods in the domestic market.

With the approach of automation labour is faced with the difficult task of determining where the true interests of its members lie. Will it, in the name of job security, so obstruct the introduction of automation as to defeat its purposes, or will its conception of what truly constitutes job security direct it to be a positive and constructive course? It is to be hoped that Canadian labour will demonstrate its initiative and courage in responding to the challenges of automation.

It is necessary too that the public understand the need to stimulate economic growth by encouraging automation to increase productivity, provide more employment opportunities and raise living standards.

The problem of achieving an adequate rate of economic growth is bound up with that of increasing Canadian industrial efficiency, which in turn is closely related to the problem of automation. Automation offers a vitally important means by which individual enterprises, industries and the national economy can grow in an era of open international trade and more equality of opportunity in world markets. Automation will make industrial relations issues matters of progressively greater public concern. It will be necessary, more than ever before, to demonstrate that private parties can reach decisions that serve the common good. In this endeavour, constructive labour-management relations are of crucial significance.

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A Union Viewpoint by DAVID B. ARCHER



Mr. Archer was born in Edinburgh, Scotland, in 1912 and came to Canada in 1920. He is president of the Ontario Federation of Labour, a member of the Ontario Labour Relations Board and an executive member of the Ontario Economic Council. He is also a board member of the International Institute of Metropolitan Toronto and a past president of the Toronto and Lakeshore Labour Council.

Automation has been heralded by some scientists as introducing the second industrial revolution. Unionists and social workers have agreed, perhaps too readily, and are already predicting some terrible consequences. Many unionists and managements have come to equate

the word automation with displacement. This, of course, need not be so, but certain challenges will have to be met. Changes will have to take place and the rate at which those changes take place will be all important in our handling of this most vexing problem.

There are certain areas that will be too involved for across-the-table bargaining, and governments will more and more be asked to involve themselves in these areas. Education is one such area. Peter Drucker, writing in Harper's Magazine, has stated "under automation, a school could do a student no greater disservice than to prepare him, as so many do today, for his first job. If there is one thing certain under automation it is that the job — even the bottom job — will change radically and often". Obviously management and unions are going to be petitioning the government of the future much more often and much more insistently than they have in the past as to the course our educational system should take. They are not going to be satisfied with membership on a vocational guidance committee that concerns itself with technical training in the standard trades.

This is only one example. In my opinion there will be a greater demand for government intervention at all levels. Obviously you cannot bargain for jobs that do not exist or wages for persons who are not employees. Therefore unions will continue to take political action and will probably expand that activity. It is not the purpose of this talk to try and guess what form this activity should or will take. Much will depend on the various approaches of the political parties, the extent of company opposition to legitimate union demands, and the nature of the unions themselves.

Unions will more and more dispute the exclusion of engineering and allied personnel from the bargaining unit. As the role of the foreman becomes less and less one of exercising authority, there will be a demand that the "managerial authority" break-off point between those who are in the bargaining unit and those who are part of management be raised to a much higher classification. At the bargaining table labour will invade more and more that sacrosanct area known as management's rights. Most managements of course will resist, some quite violently. And this seems to me to be the nub of the problem. How will unions and managements cooperate to solve the problem at the bargaining table? It would be nice to live in a perfectly civilized society in which all managements thought only of the common good, all unions were led and staffed by competent and far-seeing individuals,

and government was completely neutral and benevolent in its attitude towards both. Such, of course, is not the case, and the dialectics of industrial democracy will have to be our method of settling industrial disputes for the foreseeable future. Strikes may be entered into less eagerly and employees may be less willing to encourage such economic action, but I see no immediate or significant change in this fact of employee-employer relations.

To go back for a moment, if what I have said has some validity governments are going to have to change many of their existing statutes. The question of who can join a union and participate in its lawful activities will have to be re-examined in the light of the new type of employee who will inhabit the automated office and factory. Unions can no longer be considered merely as aggregations of manual or skilled labourers, and all others performing tasks with a higher degree of skill as appendages of management. Therefore many of the exclusions from collective bargaining now contained in the various labour acts will have to be removed to allow the new employees the rights of collective bargaining.

Where companies find it too expensive to automate their own factory, they may still find it cheaper or more convenient to "contract out" work to other factories. The question of "contracting out" in these circumstances will have to be a matter of consultation between the company and the representatives of the displaced employees.

We in the union movement are particularly pleased to see the N.L.R.B. in the United States, in a decision upheld by the Supreme Court, uphold such a proposition. I realize in our much slow-moving, conservative judicial system in Canada we may have to wait a considerable time before we receive such a favourable decision. However, according to some arbitration awards we do have a few County Court Judges so convinced.

This whole question of company takeovers for various reasons is one that will plague us for some time to come. It proves my point that where one side or the other tries to take advantage of the situation, the result is government intervention and legislation. Thus in Ontario we have legislation that provides for a continuation of the bargaining rights where an employer sub-leases, transfers or otherwise disposes of his business. We have legislation that allows a union to be named as successor to the bargaining rights of another union

with whom it has amalgamated, merged or transferred its jurisdiction. The failure of the unions to solve their jurisdictional problems has resulted in legislation dealing with jurisdictional disputes and the establishment of a government-appointed jurisdictional commission with wide powers. This despite the fact that one of the most significant developments in the settling of the age old problem of jurisdictional disputes was the merger of the two great Congresses, -- the Trades and Labour Congress of Canada and the Canadian Congress of Labour.

While legislation has dealt with lease, sale or transfer of operations or intermingling of employees of two employers, the problem of plant relocation and the resultant displacement of employees is still a major source of concern. Like many other industrial relations problems, in most cases a mutually satisfactory solution can usually be found when management discusses the matter with the representatives of the employees and negotiates a fair settlement. Not all employers are willing to do this. All I can say is, if certain companies insist on a master and servant relationship and demand the right to relocate their plant merely to meet their economic needs without regard to the social consequence of their action, then they are asking for government intervention. They can be sure the unions will not allow the situation to go by unnoticed and an aroused public opinion will demand legislation to curb this abuse of power.

Now I am sure everyone is shaking in his boots at these revolutionary developments. In my defence let me say look back 50 years and see what has happened to companies, unions and governments and their relationships one to the other and you can see I am not a Thomas Moore predicting Utopia or a George Orwell describing 1984. Really I am more in the category of Edward Bellamy looking backward, without, of course, his great imagination and ability to reduce to writing the things that were in his mind.

But do not let me appear to be too pessimistic. All is not lost. The fact that conferences such as these are taking place under various sponsorships, but often by governments or their agencies, shows an awareness of the problem and they certainly should be encouraged.

Now if you were to go into a bargaining session in the near future, what would be the most likely problem with which you would be faced by a progressive union aware that the problem of automation was invading its industry or trade?

You will probably be confronted with a demand for severance pay. The Union will argue that if, after all other alternatives have been exhausted, the worker must be laid off, he is entitled to recompense for the years he has spent in the service of this company. Severance pay is now a major collective bargaining issue in many industries because of worker displacement or the threat of worker displacement. There will be saw-offs so that lesser amounts will be given to those with less service and relocation grants be given to those who are willing to relocate and able to do the new job.

Already 89% of the office workers in Canada work less than 40 hours per week according to the 1963 survey by the National Office Management Association as reported in the Globe and Mail on July 29th. So we can assume there will be a continued demand for a shorter work week, but it may be traded in some instances for a longer vacation. This will be true in industries that are continuous process operations.

I take this opportunity of repeating what I said in Windsor five or six years ago that called forth some caustic comment from many quarters—that workers may soon be looking for and receiving sabbatical leaves, if not one year in seven as I suggested, at least of considerable periods stretching into months.

Seniority itself will have to be looked at carefully by both unions and management. The rigidity that now surrounds seniority provisions may have to be relieved to meet the demand for the new types of employees. Rather than entitling an employee to first chance at a job, seniority in the future may only entitle him to the first chance to retrain for a job. Seniority will also have to be applied on a much broader base than the plant or department if it is going to be effective. Automation could wipe out the plant or the department almost overnight.

There will be across-the-table discussion on retraining programs. Unions will probably push for more control over the standards to be used for entering apprenticeship and training programs. The push for the Guaranteed Annual Wage and/or Supplementary Unemployment Insurance Benefits will continue. Here is a very explosive area. The fear of automation and its consequent displacement of workers will stimulate the union demand for wage guarantees; on the other hand management will be most reluctant to discuss such demands when it

knows that during the transitional period job guarantees will be hard to keep.

Pension plans and other fringe benefit proposals that will cushion the worst effects of unemployment shall loom large in labour negotiations. Here again, because in the minds of the majority of the Canadian people it is too important an issue to be left to the chance of collective bargaining, governments are stepping in with a minimum portable pension program. There is no reason why management and labour shouldn't agree to much more liberal terms than those outlined in the government program. In fact I am sure it is the hope of government that they will.

To seek more wages for the people it represents, still remains the traditional role of the union. However, piece work, hourly rates and other traditional wage payment methods may even now be becoming outdated. As the rationales for such methods of payment disappear, the opposition to an annual salary may also disappear. Semantics may take care of the change; the bad "Guaranteed Annual Wage" may be replaced by the good "Annual Salary". Since it will be almost impossible to measure anyone's particular contribution to the industry, measured, that is, in terms of hours worked or work produced, and the difference in contribution between productive and so-called non-productive workers, some form of profit sharing may become more popular. As the non-productive workers join unions and, therefore, have their say in how the profit sharing shall function, union's opposition to it as a union busting device may diminish.

The traditional bonds of skill, association, etc. that formerly bound workers together in unions will be lessened to be replaced by a much more idealistic type of relationship, but like all relationships it may be more difficult to maintain than when the objects of association were tangible and immediately attainable. Therefore there will be a continuing demand for union security. The need for association of employees will be readily seen by anyone interested in maintaining industrial democracy. If management is so shortsighted as not to realize this, then again they invite legislation that will remedy the situation. As an illustration look at Quebec.

Let me sum up then as to what will be expected to be discussed at future collective bargaining meetings. Basically unions will be endeavouring to protect the jobs or at least the wages of the employees.

Management, realizing he is in a state of flux, will endeavour to make as few commitments as possible. As I said before, here are some of the bitter seeds of discord. The manner in which we both measure up to our responsibility will be the key to the industrial future of this country. In every past adjustment to social and economic changes in our society, the almost immutable law of cause and effect has been the governing factor. We have discovered the cause usually in good time, but have had to wait to apply the cure until the cruel effects were apparent. There is little to suggest that we will meet the challenge differently, but as I said before, discussions are taking place at all levels of our society. There are many managements who are aware that great problems can be created unless we act quickly and correctly; hardly anyone nowadays suggests that governments should remain aloof from the situation, in fact planning has now become respectable and accepted. The only real argument is what kind of planning, — the direct or indicative variety, — the carrot or the stick? It seems obvious to me we are going to need a great deal of both. Unions have changed many of their traditional attitudes towards management, perhaps because management in the classic sense of ownership no longer exists except in very small businesses. At the bargaining table they are in many instances confronted with persons who are in every sense employees the same as they are.

In conclusion I believe management may as well get used to dealing with larger and far more efficient unions. Research departments and personnel will be recruited that will analyze the company's propaganda and financial statements. You will notice I have separated the two. And companies will have to be prepared to defend their position as it relates to the public good. I think the time is passed when either side can say with impunity, as Vanderbilt is purported to have done, "the public be damned".

Again I return to what keeps recurring through this whole talk, the public have no intention of being damned or anything else. If unions or companies flout the desires of the public, then in our democratic system the government, speaking on behalf of the public, will pass the necessary legislation to give expression to the public demand. If the increased power that automation places in the hand of management, albeit for a short transitory period, is unwisely used, great repercussions can follow.

Therefore what may seem drastic inroads on the traditional role of management by both government and labour, great and sweeping and maybe unwelcome changes in union structures and attitudes and reluctant government intervention may well be necessary if we are to preserve those liberties and freedoms of which we are all so proud and which we regard as our Canadian heritage.

MANPOWER ADJUSTMENT PROGRAM IN SWEDEN

by NILS KELLGREN



A distinguished Swedish parliamentarian, representing the constituency of Stockholm, Nils Kellgren was born in 1915 and educated at the University of Lund. He is economic adviser to the director general of the National Labour Market Board of Sweden and a member of several committees charged with preparing legislation on social security and finance. He is a member of the Swedish Society of Authors.

Something most promising for the future is the fact that Canada and the United States together with the Western European countries are at the present time members of OECD, the Organization for Economic Co-operation and Development. As members of this organization Canada and the United States have also subscribed to a target for economic growth of 50% from 1960 to 1970. This implies a growth-rate for the most industrialized area in the world, North America, somewhat in excess of 4% a year. It is of the greatest importance that the democracies on both sides of the Atlantic Ocean have the same economic goals. It means that we have to work together and that we must more and more, in coming years, learn from each other, from our experiences, mistakes and advances.

Scylla and Charybdis in Actual Economic Policy

The experiences on both sides of the Atlantic Ocean during the postwar period have illustrated the necessity of changing ideas and exchanging facts in the economic fields. Even risking over-simplifying, we in Europe have had much experience with overemployment, and especially with inflation. In the same time, Canada and the United States have experienced — at least during the last five years — unemployment and a too low growth-rate. We have both met our Scylla and Charybdis, the inflation in Europe and the unemployment in North America — the two dangers that every country must try to avoid in order to achieve the targets of economic growth.

Every democracy, small or great in size or population, must therefore, imitating Odysseus' combined craft and wisdom, navigate between the cliffs of inflation and unemployment, the two evils that will undermine every free society and every free market system in the long run. With craft and wisdom we must create a stable, productive economy without inflation and without unemployment. It is well known that a full employment economy combined with inflation causes various disturbances which hamper productivity and endanger the price level. It is of importance to mention here that too high a level of demand or overemployment hinders the structural refacing of industry and commerce. Marginal enterprises can survive and retain labour which under other circumstances could go to more productive and expansive concerns. Such an economy will in other words hinder technological progress and will also in the long run hinder the expansion in the directions indicated by the consumer market and the free choice of consumer products.

Another disturbance more often mentioned is whether such an inflationary policy tends to push up the internal level of costs with a resulting deterioration in competitiveness vis-à-vis foreign countries, resulting in balance of payment difficulties.

It is easier to understand the evils of unemployment than it is to understand those of inflation. Unemployment is not only a problem of economics; it has a deep moral and personal aspect. A job not only provides income; it provides standing in the community and self-respect. For a citizen and for every human being a job is as much a necessity as our daily bread, the clothes we wear, and the shelter over our heads. But inflation too, in the form of excess demand can sooner

or later become an indirect threat to full employment and will create unemployment. Inflation and unemployment are the same enemies to a stable, productive and fully employed society.

Active Labor Policy

Among the long series of both general and specific economic means influencing and directing the economic forces in a country in order to obtain a stable full employment, the active labour market policy has more and more achieved a leading role.

What do we mean by an "active labor market policy"?

Swedish experiences indicate that the policy means that you have normally to influence by suitable employment-political means about 3 per cent of the labor force. In Sweden, with a labor force of circa 3.5 million, it is a question of about 100,000 persons.

I said *normally* to influence 3 per cent. In depression times the labor market policy must try to influence more, and the same in inflation times when the economy runs with a too-high temperature; but in both instances of a very disturbed economy the labor market policy can do only so much. In such times, the general policy must intervene with all its strength and efficiency. The labor market policy has its limits and within these limits it has to develop its own full efficiency.

Policies Outlined

The active labor market policy may be subdivided into the following sections:

1. Forecasting and planning of preparedness against unemployment: This is statistical work and the preparation (projection) of suitable relief work.

The basis for an efficient labor market policy is a reliable short-term forecasting of the business cycle. In Sweden as well as in many other countries, there are considerable gaps in the information available.

2. Active labor exchange: Sweden has a comparatively well built-up employment service which answers for about one-third of the labor turnover; in the larger enterprises, more than one-third. We have 250 employment offices and 600 local agents spread over the country.

They are in daily touch with each other for the interchange of information about applicants for work and vacancies. They are also in touch with employment officers all over Scandinavia. We have a common labor market for all the Scandinavian countries with full rights for everyone to move and take jobs.

Efficient and well developed employment service offices are the cornerstone in all labor market policy. The advantages of the administration could be expressed briefly in this way:

The employment office functions as the market place where both employers and employees would find out the market answers of demand and supply, the needed and unneeded skills, education, wage levels, etc. These answers are necessary to make the decisions from both sides faster, easier, and more accurate. The employment offices have the same function in regard to manpower as the stock exchanges have in regard to business — to give the right information at the right moment in the right place about investments, profits, and expectations.

The employment offices are the checking instrument to avoid unemployment benefits being paid out when suitable jobs exist in the market.

The employment service offices also have the task of informing the society and the authorities about the needs in economic policy to keep the overall balance. This information is of importance both to avoid inflation and unemployment, to direct the educational and training programs, the health and rehabilitation programs, to promote the right and most useful distribution of the labor force, particularly the youth just starting a career or an education for a career. In brief, labor service offices, well administered and led, are the most indispensable instruments in a free democratic society promoting the individual choice in the interest of the whole society, either as employer or as employee.

Historically, the Swedish employment service was organized and administered by the county boards until 1940, when the state took them over and made a nationwide administration. During the war much effort was put into recruiting better educated and skilled personnel to increase the facilities and improve the methods of working. After the war and until the recession in 1957 there was not a period of great improvement. It was only when public opinion and the state

supreme powers (government and the riksdag) realized the importance of the employment service as an instrument to make employment more stable than the improvements started again. The employment service had realized the necessity of having many means in its hands when fulfilling its task. Therefore, gradually, the other instruments in an active labor market policy were developed to help the employment service do its job. However, as the market place, the employment service offices are still and will remain the most important of all labor market means of adjustment and adaptation.

In recent years, the Swedish employment service has had the following volume of business each year: approximately 750,000 employment applications (persons); 1,100,000 vacancies; and 900,000 filled vacancies (with 70,000 by geographical transfer). It is estimated that one-fifth to one-third of the total labor turnover is handled by the 250 employment offices and 600 local agents throughout the country, depending on different professions, trades, and the economic growth in different parts of Sweden.

The employment service is not to be regarded as a legislative or supervising governmental bureaucracy. It is not to be confused with unemployment benefits, public assistance, relief, or poverty. Its function is more similar, as previously mentioned, to the stock exchanges on the business market or to the functions of banks, investment companies and other agencies helping people in the money and credit markets. Its field of operations is different, namely the labor market, but its functions are the same.

3. Unemployment insurance and unemployment benefits: Unemployment insurance in Sweden is administered in close connection with trade unions. The number of insured members is 1.4 million, about half of the labor force. In relation to take-home pay of the insured members, the benefits cover about 50-60 per cent of the real income.

4. Employment-creating measures: In Sweden we practised during the 1957-58 recession many methods of increasing the total number of jobs.

Stimulating Business

Decisive steps were aimed at stimulating investments, public as well as private. Different means were used. Public investments were

increased, roads, schools, etc., on the one hand through ordinary supplementary grants in the budget and, on the other, through public relief works which were quickly started by the employment authorities. Further, municipal investments increased, as made possible by employment policy, by means of somewhat higher state subsidies to the communes, stimulating them to start such works. Housing construction increased vigorously and rapidly, as more state loans were available. It was made possible for employment policy to place government orders in industries where orders had decreased and where it was difficult to place manpower in new employment.

The *private investments* were stimulated by allowing firms to use their so-called investment funds. According to legislation enterprises may reserve a part of their profits in investment funds. When this part of the profit is allocated to such a fund — and one part is deposited in the Bank of Sweden — this profit is tax-free. If the investment fund is later used for investments at a time considered suitable by the central employment authority from the point of view of employment, i.e., when it is wished to stimulate private investment, the immunity from taxation is maintained. The investment funds were used from May 1958 to September 1959 and from July 1962 to April 1963. By this means private investments can be maintained during recessions and can even be increased — a very usual thing during an economic decline.

By virtue of the measures here described, about 50,000 people were *directly* employed during the 1958-59 recession. Indirectly an equal number is estimated to have been employed as the result of demand being maintained. This means that employment policy answered for the employment of about 100,000 people or 3 per cent of the labor force. Nevertheless, unemployment was too high during a few months when the recession touched bottom, which shows that the measures should have been applied a little more quickly and should have been a little more vigorous.

5. Mobilization of labor reserves, especially married women, aged and handicapped: This is the other side of the employment-stimulating measures. Since the beginning of 1961, specific programs of activity in these fields have been introduced to the labor exchanges. Labor market policy has created 6,000 to 7,000 jobs in sheltered industries, but the need is much greater.

6. Mobility-stimulating measures:

A Hymn to Mobility

In a market economy based on free enterprise and competition between the best production factors there is a great need for readjustment of the personnel capital. This is particularly true in times of great technical changes such as ours. Moreover, these readjustments in many cases constitute a process which is difficult, laborious and full of failures and prejudices. Bankruptcy for an employer is one example and unemployment is another. Persons so affected by the economic laws are not particularly adaptable. They have small chance by themselves to find out what it would be best for them to do in the future. The unemployed person has to grasp at the first employment opportunity available to him. For the bankrupt employer the situation is similar.

In a free society this mobility of labor has been and continues to be a necessary condition for economic growth. Without such a mobility no improvement in technology, no geographic expansion, no new use of resources could ever have taken place. Flexibility in the movement of workers has made it possible to utilize changing economic opportunities.

Sweden initiated *starting-allowances* — an inclusive sum 500 crowns (100 dollars) to cover expenses before the first payday. The moving workers further get their *travelling and moving* costs paid for by the state. If they have families and cannot immediately take them along due to housing shortage, the family gets compensation for double housekeeping by being granted *rent allowance and benefit for wife and children*, not payable, however, for longer than nine months. During this period a dwelling is thought likely to be found. Finally the employment service assists the moving workers in finding dwellings by directing the *housing policy* — which is state-aided up to 95% — toward priorities for the expansive areas, and the employment policy has at its hand a certain number of apartments which it can directly reserve for the moving of manpower.

Among all the labor market devices, the geographical-mobility-stimulating ones are the most economical and in comparison with other means the least expensive. The allowances are used generously in the employment service. They are essential tools in the hands of

every field office worker when discussing various alternatives of employment with the applicants. Sometimes an applicant gets a ticket and travel assistance to visit an employer and become familiar with the working conditions, school facilities, and housing prospects, etc. He may not accept the offered job, but return to his homestead and, if he was not satisfied with the job, let the office work out another proposal.

It is not uncommon for an unemployed person to seek various job opportunities in different parts of the country and utilize the allowances several times. Sooner or later he will find the job he wishes and become productive.

The allowances are not rights for the unemployed in the same way as unemployment insurance benefits. The mobility-stimulating means are tools to be used for the proper person at the right moment. If the employment service judges Applicant A as the most suitable one for a job and gives him, for instance, a starting allowance to go to a new place, it is not an injustice to Applicant B, if both A and his employer become satisfied with the placement. The chance for Applicant B comes with a new opening suitable for him or perhaps another alternative — for instance — training or retraining.

It must be left in the hands of the local employment service to choose the best solution according to the market situation, the quality of the applicants, and other relevant factors. But the solutions are not to be authoritative decisions of the employment service; the officers have to discuss and re-discuss with the applicants. It is up to the applicants to decide if they will accept and use the instruments that society offers them.

Retraining Stressed

But geographic mobility is insufficient. A mobility between different occupations must also exist. For this reason an ever-increasing *training* and *retraining activity* has grown up as an element in employment policy. At present we have a capacity of retraining about 30,000 people per year, but we really ought to cover at least 35,000 per year, or about 1 per cent of the labor force.

Research studies have shown that readjustments in many cases mean a change of occupation. Of the 1928 year group of conscripts (i.e., only men) "at least $\frac{2}{5}$ have (thus) had their line of work entirely

altered by developments and adjustments during the period when they were 21-28 years old. In this there seems to be no marked difference between town and country".¹

Most of the readjustments take place within industry continuously and gradually; only the larger firms, however, have had the resources to set up special training departments that can deal with retraining and advanced training in a rational manner. Only a limited part of the market's total training requirements are therefore covered by such systems.

To strengthen and keep up the competitive capacity among small progressive companies that cannot themselves afford retraining and advanced training, it is necessary to increase public efforts both within the field of general education and vocational training for adults.

A large number of persons study on their own initiative and mainly in their free time to acquire increased or entirely new professional skills. The number of students enrolled in part-time courses, supported by the State and municipalities, amounted in 1960 to something over 100,000.

Training and retraining are to be regarded as investments in man to awaken his initiative, his ability, and his undeveloped forces and resources. Such investments are productive in themselves even if they don't immediately result in a new and better job. An unemployed person, after a successfully carried out training course, is better off in all senses in comparison with another unemployed fellow without the training. Unemployment, particularly the long month-to-month idleness, spoils the man, wastes his skill and working morale.

It is better for a man to try a new education or a new training even if he is unable to succeed. If his efforts are serious and his ambition strong, he gains a self-knowledge of highest value in the next step of adjustment and adaptation.

Training often means placing a label on a person. With this label he is invited in to the working life and is accepted. Then in the working-place the real education and training start. Without the label the unemployed individual would never have been invited.

It is impossible to estimate accurately the need for training and retraining among adults in a modern industrialized society. The

¹"Selective Migration", Einar Neymark, Stockholm, 1961.

Swedish experiences show that, besides all the training within industry and of persons training on their own initiative, there is an annual total training need of at least *one* per cent of the labor force.

To sum up facts and figures, let me repeat that the Swedish labor market policy experiences show a need to influence at least *3 per cent of the labor force* in normal times to achieve a balanced economy with high productivity, avoid unemployment — without approaching inflation.

We are not there yet. We need more people in training and retraining, more in sheltered employment, more in mobility-stimulating measures, and extra, seasonal jobs.

Employment and labor market policy has been discussed here entirely from the economic point of view: indirectly benefiting the workers by raising the standard of living. I think, however, that the “new” labor market policy is as important as an expression of democratic respect for human dignity as it is an efficient tool of economic policy. The well-being of the individual must always come to the fore. Full employment as such has been of tremendous importance to workers in Sweden and industrialized countries, not only because of the economic security it brings, but also for the psychological values achieved when the individual no longer fears unemployment or classifications as “unwanted” by society.

APPENDIX I

LABOUR MARKET POLICY 1962 IN SWEDEN

1. Employment Service Activities

Job seekers	Reported vacancies	Filled vacancies	Interlocal placements
744,000	1,100,000	880,000	66,000

2. Number of officials

Labor Market Board	500
Employment Service,	
full-time	2,100
part-time	1,000

3. Mobility-stimulating measures

Geographical stimulation	Number of persons
¹ Grants for travel and transfer.....	15,000
² Starting help.....	11,000
³ Family allowances.....	2,500
⁴ Special removal grants.....	100

¹ The travel grants are payable to the worker, provided (1) that he is unemployed or is in the opinion of the employment service likely to become unemployed in the near future owing to his having received notice or to other circumstances; (2) that he cannot be offered employment in the near future at or near his place of residence and his moving from his home district is considered to be necessary for employment reasons. If a worker granted a travelling allowance travels in his own vehicle, compensation for the journey is payable at an amount equivalent to the fare by public transport for the distance concerned.

² Starting help in the form of a 500 Kronor (\$100) lump sum payment has been granted to relocated workers since 1959. It is nonrepayable provided the recipient does not lose the job through his own fault within 90 days.

³ Family allowances for workers with double housekeeping expenses were introduced in Sweden in April 1958. Such allowances are paid when the breadwinner, residing in an area suffering from unemployment, is to take up employment in a new place where he cannot immediately obtain a family dwelling. The allowances have to be granted for a period of not more than 9 months for each of the first 3 months' full amount, for each of the ensuing 3 months not more than two-thirds of the full amount, for each of the last 3 months not more than a third of the full amount.

During the first 3 months, family allowances are the following per month:

For wife (husband)	140 kronor	(\$28)
Per child (under 16)	45 kronor	(\$ 9)
The actual rent or housing allowance up to	250 kronor	(\$50)

⁴ In 1962 special removal grants were instituted by way of an experiment for employees moving from districts with exceptionally high unemployment. This kind of allowance goes up to 2,000 kronor (\$400).

4. Training and retraining activities

Men.....	19,000
Women.....	11,000

5. Employment-creating measures

Public relief work mostly for anti-seasonal reasons.....	5,000
Sheltered employment.....	10,000

6. The cost of Labor Market Policy 1958 and 1962

	Mill 1958	Sw. cr. 1962	Mill. US-dollar 1962
Administration.....	39.0	63.0	12.6
Unemployment Insurance.....	134.0	86.0	17.2
of which grants from the State total.....	86.0	62.0	12.4
Geographical mobility stimulation.....	2.3	8.9	1.8
Training activities.....	11.5	96.0	19.2
Public relief work.....	120.0	210.0	42.0
Sheltered employment and rehabilitation.....	11.0	23.0	4.6
	317.8	486.9	97.4

7. Targets for the active labor market policy in Sweden

	Per cent of labor force	Number of Persons	Figures attained 1962
Geographical stimulation.....	1	35,000	20,000
Training and retraining activities.....	1-2	35,000-70,000	30,000
Sheltered employment.....	1	35,000	10,000

Appendix II

LABOUR FORCE AND UNEMPLOYMENT FIGURES IN SWEDEN FOR DIFFERENT POPULATION GROUPS IN THE AGES 14 AND OVER, ACCORDING TO THE LABOUR FORCE SURVEY MADE IN MAY 1961 — MAY 1963

Percentages	Labour force					Unemployed			
	Both sexes	Men	Women	Married women		Unmarried women (incl. prev. married)	Both sexes	Men	Women
				Total	With children under 7 living at home				
1961: May	59.5	78.6	40.8	37.2	30.1	46.1	1.2	0.9	1.7
Aug.	62.2	81.4	43.3	38.7	30.6	50.0	1.5	0.6	3.1
Nov.	60.5	78.4	42.9	38.7	29.9	49.2	1.7	1.3	2.5
1962: Feb.	59.4	77.2	41.9	39.3	27.7	45.6	1.6	1.4	2.0
May	59.9	77.5	42.8	40.6	32.0	45.8	1.2	1.1	1.5
Aug.	62.8	80.7	45.3	41.6	36.7	50.0	1.6	1.2	2.3
Nov.	61.3	78.6	44.3	41.8	36.0	47.8	1.5	1.7	1.2
1963: Feb.	59.8	77.4	42.6	40.5	33.6	45.6	2.2	2.1	2.5
May	61.2	77.9	44.9	44.2	34.9	46.0	1.4	1.1	2.0
Thousands of persons									
1963: May	3,803	2,394	1,409	812	162	597	54	26	28



Some 500 delegates attending the panel discussion on labour-management relations.



More than 1,300 delegates and guests attended a special banquet on Tuesday, September 18th, at Toronto.

Photos: Federal Newsphotos of Canada



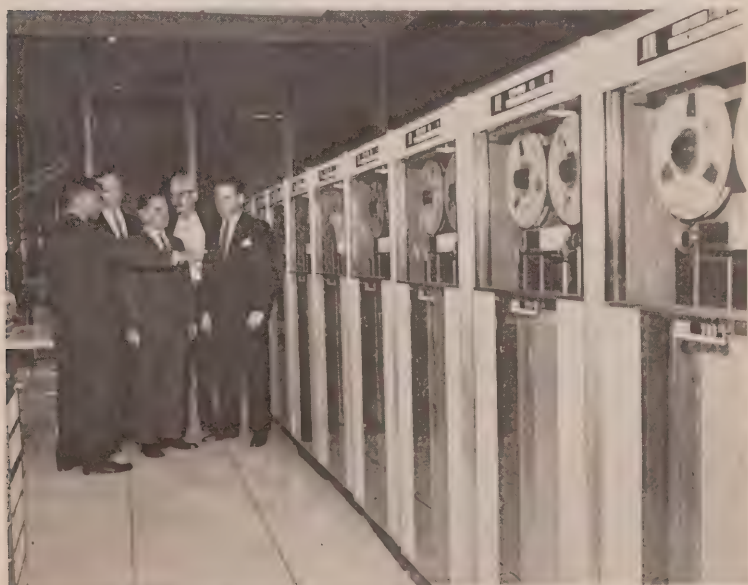
The Minister of Economics and Development — The Hon. Robert W. Macaulay (centre) with the Co-Chairmen of the American Foundation on Automation and Employment, Mr. Albert Hayes (left), and Mr. John I. Snyder Jr. (right), who were keynote speakers at the dinner on September 18th.



Professor Arthur Porter, Professor Charles Hendry and Harold Dean are shown being filmed for a television documentary on the Conference.



Conference speakers find that all kitchen work is not automated even in the largest hotels. From left to right, Ewan Clague, Sir Geoffrey Vickers, Nils Kellgren, Professor Charles Hendry and David Archer are shown polishing silver in the Hotel kitchen.



Some of the Conference delegates on a tour of an electronic data processing system on display in Toronto.

Photos: Federal Newsphotos of Canada



A number of the Conference speakers holding a "round table conference" of their own.



Honourable H. L. Rowntree, Minister of Labour, at right, with Professor Arthur Porter who was named Chairman of the steering committee to establish a permanent Foundation on Automation and Employment.

Photos: Federal Newsphotos of Canada

PANEL: TECHNOLOGICAL CHANGE AND THE ADJUSTMENT OF THE WORKFORCE IN CANADA

A Management Viewpoint by H. L. SHEPHERD

Mr. Shepherd was born in Toronto in 1914 and is a graduate of the University of Toronto. He also attended the Ontario College of Education and from 1945 to 1949 was director of studies in applied science and engineering at the University of Toronto. In 1961 he was special consultant to the federal Department of Labour on improved training and industrial workers. He is now manager of training and salary administrations for the Canadian Westinghouse Company.



Thank you, Mr. Chairman, for your kind introductory remarks.

Ladies and gentlemen, on the subject assigned to me, Management Responsibility in respect of Technological Change and the Adjustment of the Workforce, I am going to outline only four points. They are Management Responsibility with regard to:

1. Forecasting the needs for future skills qualitatively and quantitatively.
2. Training and continuous building of skills.
3. Providing incentives for skill-building as a continuing and accelerating process.

4. A reappraisal of management tradition with regard to company-community working relationships.

Before expanding on these points, let me state some underlying personal convictions arising from my personal background as sketched by the Chairman.

First, adjustment of the workforce is too serious and complex a topic to be treated glibly on the basis of a single formula developed from the narrow perspective of any one agency, whether it be industrial, or labour, or governmental, or educational.

Second, whatever the proposals of people like us, nothing of much value will occur until the individuals in the workforce regard their adjustment as something for which they personally bear an important share of the responsibility.

Third, there are many managements, of many companies, each having somewhat different problems from every other. I am trying, therefore, to comment on responsibilities common to all these managements. Each responsibility stated is subject to action, however limited, on the part of every company management. Also, each company management can act on its own initiative in discharging these responsibilities, without waiting for leadership from a governmental or other agency.

Now I should like to give what I believe is a proper definition of "the workforce". To me "the workforce" means all people at all levels who do, or could justifiably hope to, support themselves by application of their energies and talents to meeting social needs.

The outdated and sterile phrasing used to divide the workforce artificially into two conflicting groups, namely "management" and "workers", no longer applies. In my report to the Deputy Minister of Labour in 1962, I identified seven important segments in the workforce. These are:

Management and Supervision

Professional specialists

Sub-professional technical supporting staff

Highly skilled tradesmen and craftsmen

Medium skilled operators on rather narrowly
specialized jobs

Low skill operators on short-cycle operations Common labour

I further pointed out that high-skill occupations not unlike "trades," medium-skill operations, and low-skill short-cycle operations could, without too great a stretch of the imagination, be identified in the office, somewhat as in the factory.

These seven segments then, highest levels of management included, make up the workforce. All members of it must make adjustments themselves, and assist their fellows in making adjustment, in the light of technological changes.

Assumptions concerning the causes of the need for adjustment in the workforce

I am assuming that previous speakers and your collateral reading about the subject of this conference will have given you a very vivid picture of a revolution in society.

Bearing on my topic are some thoughts that shake many of my beliefs of earlier years. Here are some of them.

1. The ultimate task of the manufacturing workforce

There is an insatiable and increasing demand for material goods ranging from heavy capital equipment to fertilizers and pharmaceuticals. Manufacturing industry, given a proper combination of human qualities and technological advance, can make tremendous strides toward meeting this demand.

If this is to be achieved, then the basic task of the manufacturing workforce is to produce and distribute efficiently, progressively eliminating every action that would inhibit the provision of needed goods at lowest possible cost, for Canadians and our world neighbours.

The social task of the individual in this workforce is, among other things, to support himself by effective contribution to the economic task, or to give way to someone who can make an effective contribution.

2. Technological advance will lead to dramatic changes in the make-up of the workforce with the heaviest immediate impact being felt in direct labour in manufacturing. Among the more dramatic changes will be the decline in require-

ments for much factory labour, particularly of the low-skill category, somewhat along the lines of that already experienced in agriculture. There will also be a somewhat parallel decline in the low-skill repetitive work categories in the office.

A continuing upsurge in the need for professional and sub-professional skills in research, development, design, production, maintenance, repair, sales, accounting, finance, personnel and systems.

A change in the character and possibly a reduction in the need for some high and middle level managerial work, stemming from improved information and decision-making technology.

3. The plight of those displaced

If more and more goods can be produced by a relatively smaller proportion of the populace (backed up of course by improved technology), then it seems inevitable that some people now in manufacturing must adjust to being in new and different lines of work. The non-manufacturing areas: finance, education, general services, social services, government, religion, entertainment, do not appear suitable for the absorption of all those who may be displaced. Besides, these areas too, are susceptible to technological advance.

These three thoughts then lead me to one very great concern. We must face up to having a sizeable segment of the adult population out of the workforce and on welfare, or we must provide make-work projects within their capability, or we must (and I pray we can) exercise great effort and ingenuity in a third direction.

This third direction includes:

Identifying those likely to be displaced, before they actually are displaced.

Convincing them that they must take action to keep themselves employable.

Providing opportunities and assistance so that they can take action, if only they will.

Now, how do company managements pick up a fair share of the responsibility, starting now, for workforce adjustment under these revolutionary conditons?

1. Forecasting needs for future skills qualitatively and quantitatively

Let me use some experience close to home as an example of what I mean under this heading.

Our Company needs machine operators, and it has had a good supply of them for many years. Recently however, we have noted an increasing state of imbalance between the total number of those "carried on strength" as machine operators, and those actually having the skills needed to handle present-day equipment, materials, tolerances, tooling, feeds, speeds, set-ups and so on. Our ineffectiveness in forecasting precisely the *kinds* of skill needed, and numbers of people requiring the skills had put us in a dangerous position. We now find it essential to improve our forecasting in the light of both known needs *and* possible future technological change. It is not enough to *have* certain levels of skills and certain numbers of people today. Tomorrow's needs must be estimated.

The act of forecasting precise skills is not enough. As we undertook training to update and upgrade our people we discovered that training in our precise techniques could not be done effectively until certain basic mathematics, blueprint reading and measurement had been taught or, at the least, refreshed. We also identified a few cases in which individual capacity to continue to be *modern* machine operators appeared marginal as did their capacity to absorb training. Total skills needed must therefore be analyzed on three levels — precise skills related to the particular requirements of the company and its products, broad occupational requirements referring to general mastery of equipment and process, and fundamental qualification requirements in terms of mathematics, science, language.

Now changes stemming in whole or in part from technological change are occurring in the other six segments of the workforce in a similar way. Improved forecasting of needs for precise skills, general occupational requirements, and fundamental qualification requirements is therefore needed at all levels by all managements. Each company thus could, if it would, gradually build up a forecast of skills needed for the future, in all segments of the workforce. The forecast would be far from perfect, but better than nothing. Such a forecast would provide a cornerstone for determining the direction in which the workforce ought to change, determining the numbers and

kinds of people who may continue to find employment, and determining *how* to obtain skills needed by the company from partial skills available in the population.

Prediction within the company is not enough. Because people will be flowing both from and into the labour market more rapidly than in the past, some agency in the community must build constantly updated lists of future skills needed and skills available currently. Various existing agencies — and we have heard of the value of the labour marketing board in Sweden — may be able to help. If no effective agency exists, then surely managements must either set something up by cooperative action, or vigorously press for some third party to undertake this particular task.

Out of such efforts could grow, region by region, a rolling or perpetual forecast as a guide to placement, relocation, training, and education in terms of qualities and quantities of skills likely to be in demand for the future.

More precise and longer-range forecasting will inevitably produce at least a second result which, while thoroughly disagreeable, is essential and constructive. Each company will gradually improve its ability to identify obsolescent skills, the kinds and qualities of people who are unlikely to develop new skills to replace obsolescent ones, the numbers of these who can probably remain effectively employed and the numbers who must be displaced. With such findings reported in advance to an external third party, there could be useful improvement in tackling questions of where to relocate displaced people and how to help them earn qualifications to make their relocation practical.

Training and continuous building of skills

It has become a popular pastime to say that if companies train everybody in everything, there will be no more problems. This is nonsense.

Actually, a management has a responsibility for getting training in perspective, within and outside the company, and taking only such action as is practical and economically sensible.

Can skills be found on the labour market more economically than they can be built by training programs for employees?

Will training increase the efficiency and minimize cost of producing and delivering the product?

Could external educational agencies do the job as well or better (possibly with company help)? Can they by so doing embrace other employees or prospective employees of other companies, thereby contributing to the broader social scene at modest incremental costs?

There are certain training activities for which responsibility needs to be determined.

1. It is clearly a management responsibility to give prearranged, systematic on-the-job, or off-the-job, training to employees in the techniques and practices of the particular company. Such training is now being done, of course, by many companies in all segments of the workforce. The range is almost infinite.

New techniques in packaging for operators in a chemical plant.

Computer technology for managers, or engineers, or accountants, or technicians.

Management techniques.

New materials and processes for skilled and semi-skilled factory work.

Standard forms of letter-writing for stenographers.

Design techniques for engineers.

2. It is also a management responsibility, having improved its skill in forecasting future needs, to see that training opportunities are provided so that employees can prepare themselves for the future. This may include opportunities to shift from one occupational field to another, for example from copy typist to key-punch operator.

This responsibility can sometimes be wholly discharged best within the company. Often, however, management and professional staff works with a school to see that the opportunity is provided with minimum interference to normal operations of the company.

3. For the long haul, it is not a management's responsibility to make up for historical deficiencies in the school system, nor for individual neglect in acquiring all possible education.

Nevertheless, too few companies in the past pressed vigorously for practicality and flexibility in the school programs and for individuals to continue to improve their qualifications.

Because of past default and present need then, it is a management responsibility to work very closely with educational authorities. By doing so they can both give and get advice and assistance. The end result will be realistic means by which all seven segments of the workforce can prepare for the future.

Providing Incentives for Improved Skill-Building as a Continuing and Accelerating Process

Responsible managements through improved forecasting, training analysis and action, and close cooperation with external agencies will influence employees and public alike in attitudes and willingness to act toward self-improvement. Many people spur themselves into action when they see —

A. The need for following a program and the opportunity to do so

They will be persuaded where they see that

1. Companies believe in skill-building because the companies are actually doing something systematic in that field.
2. Skill objectives for the probable jobs of the future are actually being identified and made known.
3. Hiring standards reinforce skill objectives.
4. Opportunities for keeping up-to-date with hiring standards and skill objectives exist through combined action on the part of educational authorities and companies.

Then there are three other ways in which management is responsible for providing incentives for skill-building.

B. Opportunity for advice and guidance

Good supervision within companies must include opportunity for practical employee counselling — An announced company policy or program is helpful, but it takes good supervision to help the employee

understand **why** keeping up-to-date is essential, and **how** to go about it.

C. Financial incentive

Pay, always a delicate matter, nevertheless cannot be ignored. If updating and upgrading is important to company and employee alike in achieving full value from advancing technology then managements must reinforce this fact through pay practices.

Work requiring high skills, and hence requiring a considerable investment of time and effort by people who acquire the necessary skills, ought to be rewarded. For a variety of reasons including inept management, labour market conditions, ill-considered collective bargaining agreements, poorly administered incentive pay plans, there has been a tendency to reduce the pay spread between jobs of clearly different skill requirements.

In my view, it is a management responsibility to encourage skill-building in the workforce by ensuring adequate pay spreads between low-skill and high-skill work. In several instances in recent years companies have given careful attention to providing improved pay potential for those who can meet high and up-to-date skill requirements. There is no doubt that this does provide strong incentive for personnel to qualify themselves for the greater opportunities.

D. Making transition and adjustments in as orderly a way as possible

We must remember that we are talking about *adjustment* of the workforce. Now adjustment to new technology, displacement of low-skill people and acceleration in demand for high-skill people is inevitable but it is undesirable to try to make it instantaneous. The rate of adjustment is partially controllable, and needs to be considered very carefully.

Industry that is highly developed technologically is *capital* intensive. The less the technological advance, the more industry is *labour* intensive. The more expensive the workforce becomes, the faster an industry has to shift its gears, improve technologically and become capital intensive. We need to look therefore at rate of pay advancement in all seven segments of the workforce balanced against company and community capacity to handle displacement

prospects, and against the time needed by displacement prospects to update their qualifications.

But we must remember that in producing goods, public world demand is to get ahead with improvement. Thus we may usefully try to control the *rate* of application of new technology, but we cannot halt it. And we cannot look to the factory as the major means for absorbing all the low-skilled in the population.

E. A reappraisal of management tradition with regard to company-community relationships

In a recent article in *Management Information Systems* for the AMA, Mr. D. E. Browne, A Group VP of Lockheed Aircraft Corporation, makes an interesting point about "traditionalists" and "managerialists". Traditionalists, he points out, have a primary concern with company survival and growth, and they focus upon profit-making to assure these goals. Managerialists conceive of a company as primarily a social institution with social responsibilities of a high order.

I find myself agreeing with him as he later on points out that these viewpoints are not mutually antagonistic.

No managerialist, however ardent, would claim that companies do not need to survive and grow, and to generate profits in order to do so. Traditionalists like myself, however, cannot help but recognize that we are being thrust toward social responsibility in the community. Everything I have said so far indicates that we can no longer confine our horizons to our own companies. For many years, of course, leading companies have been tightening their relationship to the community at large. Many others have not developed any sense of urgency in this direction, either as corporate managements, or individual members of management and the professions who ought to see the need.

The traditional viewpoint is no longer good enough. It is therefore an overriding management responsibility to broaden its horizons and raise its sights. Among other things this will be helpful in encouraging the workforce to adjust to the changing times, and thus to influence constructively the fortunes of the company, the local community, and even of humanity itself.

This thought applies to us all. All of us must re-examine our traditions. As we do so let us try to do a thorough job and to set new goals that are worthy of the great challenges of the future.

This conference, Mr. Chairman, is an example of people working in an area far broader than that of their normal working environment. I am sure it is intended to help all of us accept the need for new visions. May I wish every success to our hosts and to all those present, and offer my thanks for the privilege of participation.

A Union Viewpoint by RUSSELL HARVEY



Mr. Harvey is a pioneer in the Canadian labour movement, having been a member of the Ontario Labour Relations Board since its formation in 1944. At one time Canadian director of organization for the American Federation of Labour, he is now Canadian representative of the International Union of Office Employees. From 1949 to 1955 he was chairman of the Atomic Energy Allied Council and for 25 years a director of the Workers Educational Association.

Due to the almost identical nature of the industrial economies of the United States and Canada and due to the relatively advanced state of development and adoption of automation in the United States I could find no better means to attempt a contribution to this conference than to present a carefully drawn assessment of national experiences prepared by the President of the Office Employees International Union with whom I am associated.

In this treatment of the growing "automation" crisis he seeks to achieve a sharper focus by asking "Why Automation?".

In the United States today, we are experiencing a revolution whose implications are so vast that I doubt that the most advanced digital computer could begin to analyze them. But no one has yet been able to answer, except in 19th century cliches, the overriding question — why automation?

Of course, we all agree, since there are no longer any Luddites among us, that automation is the best thing in the best of possible worlds. We all know that mass production in the pre-automation era presumably lowered prices to consumers. Certainly, the prosperity of the Western world since the end of World War II is totally unprecedented in man's history. That era may be drawing to a close.

For the last decade, the United States has witnessed what may be properly defined as the automation revolution.

Although much attention has been given to the displacement of workers in factories — the so-called blue-collar workers — less attention has been given to the effect of office automation on the white-collar employees. But, in no case has society inquired: why automation? The individual employer or the large corporation automates in order to cut down on labour costs, to increase efficiency and, not least, to increase profits. In terms of the individual employer, then, automation is just simply good business common sense. If, by investing a million dollars in some new technology, one can dismiss 200 workers (the rule of thumb in the United States today is that for every \$5,000 invested in automated equipment, one worker can be dismissed) obviously it isn't too long before such an investment will pay for itself. And given the ingenuity of automation equipment manufacturers, it will not be long before the \$5,000 figure will be cut to \$2,000. Such a possibility is already envisioned by John I. Snyder, Jr., President and Board Chairman of United States Industries, who has submitted the \$5,000 rule of thumb figure.

Personally, I think the cost of automation per worker may be much lower since a good deal of computer equipment can be rented at anywhere from \$1,000 a month up.

Solid state digital computers are being sold or rented by American firms at an ever increasing rate. So are optical code scanners and readers. Incorporation into offices and plants of these advances has a direct effect on continuity of employment.

Recently, an automatic "law clerk" was demonstrated to the American Bar Association. The machines can perform seven man hours of legal research in a matter of minutes. For example, to obtain the answers to a question involving tax exemptions, the computer analyzed 400 laws from 50 states and the District of Columbia, and, in less than ten minutes, it had typed out the statistical summaries and the case citations involved.

The extent of this revolution in the offices of American industry was not foreseen even a few short years ago. Before the advent of the solid state digital transistorized computer, electronic data processing meant a giant vacuum tube type of computer which required several thousand square feet of space to house. These machines also required air conditioned and moisture proof surroundings. Those few companies using such machines needed several years to switch from their former manual type clerical operations to the giant computers. The time involved, therefore, gave all of these firms the opportunity to cut the size of their clerical staffs through attrition rather than through layoffs. In many instances, the companies involved did not completely rely on these computers and continued the same clerical systems which were, in effect, dual to the computer operations.

Solid state transistor generated computers changed everybody's thinking. These machines, hardly bigger than an office desk, are capable of performing all, if not more of the operations of the predecessor computers. Large and medium sized companies are purchasing or renting these machines at an ever increasing rate. These new computers are to the office what the bulldozer was to the construction industry.

The Associated Press recently installed a specially adapted computer in its New York office. Management announced to 51 employees that 47 positions would be eliminated and there would be four remaining positions. The St. Regis Paper Company stated that its computer eliminated twenty-three per cent of the personnel employed in its general accounting offices.

In 1960 the United States Bureau of Labour Statistics studied the effect on office employment of a number of computer installations. They found that out of every hundred office jobs affected by the computer (for example, payroll, inventory control or general accounting) 25 jobs are immediately eliminated. However, computer tech-

nology moves so quickly that I can say that this ratio is already much higher. Computer Sciences, Inc. has estimated that 10,000 computer installations were made in the year 1961. The number of computer installations to be made in the coming years, I believe, will be at a rate far in excess of 10,000 per year.

The effect of these installations on employment is apparent. The rate of office and clerical unemployment has soared since 1958. According to the United States Bureau of Labour Statistics, unemployment figures for office workers were as in the table below:

January 1957	263,000 workers or 2.8 per cent of total
January 1960	381,000 workers or 3.8 per cent of total
January 1961	438,000 workers or 4.2 per cent of total
January 1962	466,300 workers or 4.6 per cent of total.

The projections for the future indicate that electronic data processing will affect clerical employment even more seriously.

The United States Bureau of Labour Statistics also announced that while the rate of growth in white-collar employment in non-automated companies is approximately 15 per cent per year, white-collar employment in automated establishments grows at less than one half of that figure, or approximately seven per cent. Assessing employment opportunities in the commercial banking industry in the United States through the year 1975, the Bureau of Labour Statistics states that only 400,000 additional employees will be required as compared with some 600,000 workers if banks were not automating.

Computer centres are springing up throughout the nation. These centres eliminate small office staffs overnight. It is a simple matter for a small company to use the computer centres and, at the same time, guarantee secrecy of confidential company information. A do-it-yourself computer centre has been opened in Los Angeles by Computermat Inc. It operates along the same lines as a laundromat. The client solves his own engineering and scientific problems with a minimum of instruction. If assistance is needed, there is an experienced staff to help the client in the preparation of programmes and in machine operation. An extensive library of programmes and sub-routines is also available. Two computer service centres are today located in New York's financial district.

While giant security concerns have their own computer systems, an increasing number of smaller brokerage houses use these service centres. All of the back office accounting for these brokerage concerns is accomplished at the IBM unit, known as the Service Bureau Corporation. Each day at the close of trading, all information dealing with customer stock trades, commissions due and other important data are forwarded to the centre. The centres work all night and deliver to the users, before 8 a.m. the next day, complete records for all customers. Complete monthly statements for each customer are also prepared and sent to the brokerage concerns.

The Atlantic City Electric Company in New Jersey uses a high speed scanner, perfected by International Business Machines, which can read typewritten pages at the rate of 1,800 words a minute and convert the material to a punch tape which automatically operates a teleprinter. This machine, which punches out on tape the customers' account numbers and the amounts of their payments, does the work of 24 key punch operators.

Xerox, a relatively new firm in the United States, is renting reproduction machines almost as fast as they can be manufactured. These machines can reproduce any copy including pictures in a matter of seconds. They are rapidly eliminating the need for invoice typists and copy typists of all kinds. A dataphone service has been perfected by the American Telephone and Telegraph Company. This service allows "business machines to speak to business machines", meaning that one computer can direct information to another. Five thousand of these dataphones have already been installed and the A.T. & T. Company has stated that they expect to install a total of 60,000 within two years.

Information Products Corporation sells a machine called Interrogator which looks like an ordinary electric typewriter with a small viewing screen. The Interrogator, however, can be used by an office clerk to send and receive detailed information from a remotely located computer at the rate of 15,800 characters a second. This machine can do credit checking, insurance investigation, banking, production and inventory control.

The Radio Corporation of America recently demonstrated a phonetic typewriter which transcribes from the spoken word. This electronic device also takes the spoken message, translates and repeats

it aloud *in three other languages* and, simultaneously, *prints a message in four pre-selected languages*. At the present time, scientists who are perfecting this machine, are limited to 100 monosyllabic words in each of four languages, English, French, German and Spanish. When perfected and available for commercial use, this new phonetic typewriter will have affected, if not eliminated, the jobs of 1,500,000 typists, stenographers and secretaries in the United States.

There are numerous other innovations which will eliminate clerical positions. While it is true that a number of new occupations are appearing on the American scene due to the advent of office automation, such as programmers, console operators and peripheral equipment operators, we know from experience that the number of these positions will be infinitesimal compared with the number of eliminated classifications.

One of the provable facts about the Industrial Revolution is this: while it eliminated jobs, it very quickly created new jobs on a far greater level than in previous centuries. Mass production industries became normal in industrial societies. What few people realize is that the automation revolution is *deliberately* intended not to create new jobs. I am not saying this in terms of a "conspiracy" by employers.

Perhaps the question — why automation? — cannot be formulated meaningfully. What is the "motive and the cure"? Societies have a way of moving in directions which no man can foresee and each of its actions produces a reaction which may or may not be equal or opposite. Yet if we cannot formulate the philosophical question, at least we must try to formulate some empirical answers to the oncoming disaster which I foresee because of automation and even more because of the static quality of the American economy during the past decade.

Although our trade unions seek retraining through government subvention and collective bargaining, we know that this is a small part of the answer to the problems relating to clerical unemployment due to automation. For example, a recent government report indicated that relatively few persons 45 years of age and over were hired to work directly on computer operations. The median age of computer employees is about 32 years. Only 10 per cent of the employees in new automated units were 45 years of age and over. When firms without collective bargaining obligations employed workers from outside their firms to operate computers, it is interesting to note that

none hired anyone 45 years of age and over. The median age of these new employees was 26 years.

Primarily through the efforts of organized labour, the Federal Government in March 1962 adopted a three year retraining programme designed to train workers displaced by automation. It is estimated that approximately 400,000 workers will benefit by this retraining programme. Labour or industry, however, cannot either unilaterally or bilaterally resolve the problems of wholesale displacement of office and clerical workers. This job crisis requires the active participation of the government, if we are to avoid the possibility of millions of unemployed white-collar workers whose jobs have been permanently abolished.

Our labour force continues to increase. High school and college graduates available for office and clerical work are also increasing. All available statistics indicate that automation will drastically curtail the number of positions sought by these newcomers to the labour market. With the assistance of industry and the government, we are seeking to change the curriculum of our secondary schools and commercial colleges to avoid the possibility of preparing students for occupations in the business world which will cease to exist during the next few years.

Our union (the Office Employees International AFL-CIO) has asked that a special Federal Commission be set up by the government with powers of recommendation. This Commission should be composed of representatives of labour, industry and the public. We would like to have such a Commission consider as primary recommendations:

- * Training and retraining through the Unemployment Insurance of special redundancy funds.
- * Special training centres for office and clerical employees advanced in age and not readily adaptable to the operation of automative devices.
- * Higher unemployment insurance payments and extension of the time duration for such payments for workers displaced by automation.
- * A method whereby displaced workers can be located in other areas in industries where shortages of personnel may exist. The expense of moving such individuals and their families to

the location of the new positions should be paid through the unemployment insurance system.

- * Earlier retirement for women on some form of pension commensurate with their service. Women now make up two-thirds of the white-collar work force of the United States. It is far more difficult for a woman in her forties or fifties to gain new employment than for a man in the same age bracket.
- * A radical cut in the work week is inevitable. We believe a shorter work week must be established, particularly in view of the tremendous increase in productivity and increased profits resulting from the installation of automotive equipment.

There are some in the United States who argue against a reduced work week. However, the course of American industrial history shows that the work week has been curtailed approximately three hours per week per decade since the turn of the century as a result of assembly line mass production.

Automation in factory and office has and is boosting production far beyond the increases obtained through mass production in the 1920's, thus a drastic cut in the work week is essential. None of these proposals by themselves or perhaps collectively is a durable solution. The problem of unemployment caused by automation cannot be separated from the overriding necessity of maintaining broader economic growth. It is a truism to suggest that an expanding economy can be achieved through monetary and financial policies designed to broaden economic activity. This is really another way of saying that there must be a higher level of demand and the mass income necessary for essential mass purchasing power.

I am not even certain that the goal of free trade unionism — full employment — is an answer to the automation revolution because we may find ourselves paradoxically confronted by labour shortages and labour surplus at the same time. Inadequate retraining may not satisfy the demand for the kind of workers needed in the industrial society of the next decade and yet we will have a mass of unemployed workers. What we must begin to think about and in the most immediate terms are socio-economic approaches in a democratically oriented industrial society.

Millions of people in America are weekly recipients of foods which are defined as "surplus" under American farm legislation but which

are the staff of life for workers who are unemployed or whose low wages are insufficient to support their families.

Are we approaching a point where the unprecedented and even mounting productivity potential of American industry will find itself without a mass market and will, therefore, have to consider *giving away free a large percentage of its output?*

Why is American industry gearing itself to a system of productivity which views man as obsolete and redundant when his very obsolescence and redundancy excludes him as a buyer of the output which American industry can now create? Which of the five million plus unemployed workers and their families can buy anything more than bare necessities?

President Kennedy has estimated that each year, one million workers are displaced by automation, a fantastic figure. In this year alone, President Kennedy's Chief Economic Adviser Walter Heller has stated 1.2 million persons will enter the labour force while another one million job holders will be displaced by automation. Secretary of Labour Wirtz recently estimated that between 1962 and 1967, the American economy will have to produce more than 16 million new jobs *just to stand still*. He has predicted a possible 7 per cent unemployment figure in 1967.

Trade union leaders, like Albert J. Hayes, President of the International Association of Machinists, have estimated that in a few years, at the present rate of *no* economic growth, we will have 10 per cent of the work force — or eight million workers — unemployed by 1970. The response of industry and many government executives is that automation will, in the long run, create enough new jobs to meet the demands of our increasing population. In America, we are just beginning to understand the full meaning of Lord Keynes' dictum that "in the long run, we'll all be dead". Time is moving so rapidly that the short run and the long run have blended and no realistic line of demarcation exists.

Automation technology wipes out jobs — it cannot be said often enough — with such speed that no "long run" hopes can have any meaning to the five million plus unemployed nor to the American trade union movement. American trade unionism has adopted what can be defined — perhaps, too piously — as a farsighted position: we favour automation. This has become a tenet of trade unionism,

but shortly we must begin to ask ourselves far more realistically (and we are, more than ever before) — why automation?

If the price of automation is hard core unemployment, and we know from the thirties what hard core unemployment can do to character and a sense of psychic security, are we prepared to undergo such desperate individual crises in the name of — holy of holies — Progress? The Fat Boy in *Pickwick Papers* enjoyed himself by saying “I wants to make your flesh creep”. Perhaps what we need today are fat boys who can break through the euphoria in which our technicians and labour statisticians live. There are no Luddites among us, nor even pro-Luddites, nor, I think, will there be any. But what I can predict is that the American worker, whether trade unionist or not, will reject the soothsaying platitudes of the “sweet bye-and-bye” prophets, who hold before us a golden future amidst a temporarily or “short-run” cruel present.

The aimless unplanned, explosive and destructive introduction of automation — under whatever name it comes — is reaching a point where it is no longer tolerable. We can solve it, as we will, temporarily by unemployment insurance, retraining, the shorter work week, charity, but none of these can do more than allay the overwhelming burden that automation has put on the American worker.

We may have to restructure our economy, replan our society, ask over and over again, what is the purpose of technical change, what is the role of man in such a society, can we afford to have millions of educated men and women wandering about in a society which has no use for them? These are questions which we have avoided asking. These are the questions which cry for an answer, if, indeed, there is an answer.

Without seeking to propose answers to the myriad economic and social problems and dislocations of former basic values it is evident that two perfectly normal facts of human nature constitute the principal and primary obstacles to be overcome, “fear of the unknown” and emotional “resistance to change”.

The ability to effectively utilize automation for the maximum benefit of man is thus based on the willingness of all segments of society to collectively re-examine the validity of present and inherited fixed and static convictions in support of special interest rights or privileges.

It is manifestly correct to state that only by the acquisition of factual knowledge of the capacity and potential of automation for good or evil can we possibly bring reason to bear on the problems arising from the effects of automation.

A great stride in this direction could be made immediately as the result of the information and inspiration gained at this conference by all present agreeing to a plan of permanent consultative organization at federal, provincial and city and town levels by which responsible and creative people may participate in more effective communication to thus minimize the normal clash of competitive forces. To this end I will seek in panel discussions to enlarge on the compelling reasons for more effective internal organization for communication and education.

INDUSTRY'S HUMAN RESPONSIBILITIES IN THE AGE OF AUTOMATION

by JOHN I. SNYDER, JR.

Chicago-born, Mr. Snyder was educated at New York and London Universities and is president and board chairman of U.S. Industries, Inc. He is also a director of several major American corporations, a member of the board of New York University-Bellevue Medical Center and co-chairman of the American Foundation on Automation and Employment, Inc.



First I must tell you that I consider it a signal honor to have been invited here tonight to address this distinguished assemblage on the subject of automation. I thank the Ontario Government very much indeed for their kind invitation. I sincerely hope that from the fields of industry and business across our common border we may bring to your significant conference just a few thoughts about the technologies of our time, about the human problems our technological achievements are creating, that may be worth taking home and thinking over again at your own leisure.

Now, let me begin by telling you something you all know well: that it took me only about three hours today to travel from my office in New York to this hotel in Toronto. That's total elapsed time, door

to door — or portal to portal, as we used to put it in the days when John L. Lewis was in his grand prime. And I must say that no matter how sophisticated one allows himself to become in this breakneck Space Age, this kind of speed still comes as a surprise. One hundred years ago, the trip would have taken more than a month, and fifty years ago, several weeks; in a car during World War II (assuming one could get gas) it would have taken a couple of days.

I mention jet travel of course only as a symbol of our technological age, in much the same way one mentions automatic elevators. Today, in your country and mine, we are increasingly surrounded with such symbols — signs of how rapidly our technologies are advancing, how they hold it in their power to present us with rich rewards and a better way of life. But as we all know much too well, these technologies are also presenting us with new problems, which is precisely why you've been meeting here for the past two days. Automation's effects are becoming matters of primary critical concern to all of us. Automation knows no city limits or national boundaries; it isn't concerned with whether the people it displaces are Americans or Canadians or Europeans. Its problems are in fact achieving a sort of universality. Many of the difficult situations we in the States are trying to cope with in such cities as Detroit, Los Angeles, Pittsburgh and New York are the same as those you're trying to ease in Toronto, Hamilton, Vancouver, and Regina.

In your meetings here this week you have heard a great deal about automation in terms of its economic perspective, its technology, and its impact on society; you've heard how it's affecting economic growth and employment here in Canada. In the States we've been holding similar conferences. The ultimate aim of all these meetings is, of course, to search out solutions to the complex human problems that automation is creating. This search is underway not only in North America but throughout the Free World. Responsible men everywhere are beginning to look for new ways to provide new work for human beings whose very lives are threatened by machines.

In this search, it is increasingly clear that the old solutions to technological displacement and unemployment, the hand-me-downs from the Industrial Revolution, or even from the Great Depression of the Thirties, just won't do; they are simply not advanced enough, or sophisticated enough if you will, to be used today to help ease automation's impact. What we need are totally new ideas, real innovations.

This need is already urgent; it will be critical sooner than any of us would like to admit.

My invitation to address you tonight carried what our lawmakers call a "rider," or condition: this was that I tell you something about our American Foundation on Automation and Employment. This I propose to do. I intend to deal only briefly, however, with such matters as the Foundation's history, its operating mechanics, and the studies it is conducting. The fact is that the Foundation, like jet planes and automatic elevators, is only a symbol of something infinitely more important—a symbol of a manner of thinking which, I submit, will have to become much more common and much more widespread before we can begin to come up with the kinds of new ideas and innovations that are going to be needed before automation's problems are solved.

The Foundation was created early in 1962; it had been discussed for six of seven years before that. It was created because, as major manufacturers of automation equipment, we felt a direct line responsibility toward those people whom our machines would displace. To some small degree, I suppose this feeling was altruistic; but any altruism we felt was coupled with another practical conviction:—that it was, and is, and will continue to be in the best interest of business to consider the human factor when automation is adopted; that it is not only moral but eminently practical for business to look beyond the profit and loss statements and to insure, to the best of its ability, equitable treatment for those people whose jobs are affected by labor-saving, cost-cutting automated machines.

To this end, we set up our Foundation. Joint sponsor with us, in the United States, is the International Association of Machinists, one of our country's leading labor organizations. The Foundation is financed by "dues" based on the lease or sale price of each automated machine purchased from our company, with the dues per machine varying from \$25 to \$1,000. The funds collected go directly to the Foundation, to be applied specifically to the search for ways to alleviate the bad effects of accelerating technological change on human beings.

To date, the Foundation has authorized several research projects. Working in conjunction with one major university, we are trying to analyze how effective the shorter work week may be as a temporary or long-term solution to unemployment caused by automation. We are

also studying the problems of retraining adults displaced by automation. In Europe, we are conducting an exhaustive examination of steps being taken to solve problems connected with automation in the Common Market countries. And in New York City, at the request of Mayor Robert Wagner, we are attempting to set up the structure for "early warning system" which will show us in advance where displacements are likely to occur, where other work may be found, and what kind of retraining problems we will have to solve to fill the new positions.

As you may be aware, our organization in the United Kingdom, U.S. Industries Inc. Great Britain Ltd., last year sponsored a British Foundation similar to the American one. This is also a non-profit foundation with an independent board of directors made up of men from management and trade unions, as well as public representatives. It is totally British and its funds, which are supplied by my company, are being devoted to helping British workers.

This then, in brief, is what my company is doing, in conjunction with one major and farsighted international labor union, in the hope of finding some kinds of solutions, as quickly as possible, to the problems created by technological change. Other companies have also set up foundations — no one quite like any other. Still others are attempting new, and often highly controversial automation-age labor contracts.

Now I suppose it must be true that individuals here in Canada are reacting to all this furore in much the same way that individuals in the States do. Some must feel that those of us who are trying to do something about automation's effects are quite right; others probably feel fairly neutral about the whole thing; still others undoubtedly think we're overdoing it — that there is no serious threat to our economy or to our society, or to men, in today's technological changes, that there are no real problems at all.

I have no real statistics on the subject, but I suspect very strongly that in the United States a majority of businessmen — major executives — fall into the last classification. They are doubters. They have not yet realized the broad sociological aspects of automation. And since they don't feel there are problems, they are looking for no solutions; they feel that somehow, everything will shake out fine and settle itself.

Well, I disagree rather violently with the doubters in the States, and I'm willing to take issue with them here in Canada, too. I understand their doubts, but I have maintained that they're living in a world of myths. And if our Foundation can accomplish one meaningful task, I think it should be the dispelling of such myths, the focusing of attention rather on the facts, and the dramatizing of how frightening the facts really are. I'm sure this conference of yours will have the same effect — it will probably instill in many of you a new awareness of the problems of automation, and some measure of determination to tell the truth about these problems.

This matter of telling the truth about automation is not so simple, however. The truth isn't easy to accept; therefore there's a tendency to label those of us who talk this way — we are "pessimists," "prophets of doom". As Albert Camus, the Nobel Prize winning novelist once said, "Truth, like light, blinds. Falsehood, on the contrary, is a beautiful twilight that enhances every object." Or as one of our humorists put it a hundred years ago: "It ain't what a man don't know that makes him a fool, but what he does know that ain't so."

Here are some of the myths about automation which I feel have to be dispelled, for they are presented to us as panaceas and in this area I'm afraid there are no panaceas.

First there is the myth that automation will actually create jobs, that everyone will always be employed because it takes people to make machines and keep them running. Perhaps in the long run this will turn out to be true, but I doubt it; and anyway, as Lord Keynes once said, in the long run we will all be dead.

The hard fact we must face is that our new technologies do not produce jobs for those workers they displace. Detroit is a center of automation and it is one of our country's largest and most critical unemployment areas. At last count, automation was eliminating jobs in the United States at the rate of more than 40,000 a week. And we must also keep in mind that automation is not only displacing people directly, but also indirectly through what we call "silent firings," referring to workers who, without automation, would eventually have been hired for specific tasks that are now automated. There are also those workers who lose their jobs through vertical integration due to automation, as in the case of a company which formerly supplied a third of Ford Motor Company's body parts. When Ford automated

its stamping plants, no Ford employees were displaced, but 5,000 employees of the body company were obliterated from the payroll.

The second myth we must bury is that all those who lose their jobs to automation can be retrained and put into other jobs requiring higher skills and paying more money. In some cases of course this will be possible; but not in any overall way. In the first place fewer jobs are available; in the second many workers are just not retrainable, due to their levels of intelligence or education, age, or aptitude. We have found that many workers simply refuse retraining because they know that the jobs for which they might train do not exist.

Our list of examples illuminating the fallacies of the retraining myth is a long one. I could go on and on reciting the grim case histories of dozens of companies whose experiments with retraining have failed for one reason or another. You just cannot force people into retraining, and after you retrain them you can't manufacture jobs out of thin air.

Myth number three is that we will be able to put large numbers of people to work running automated equipment, and use them also in the building and maintaining of this equipment. This is just not true. Experience has shown that after the initial "debugging" of automated machines they require relatively little maintenance. If this weren't the case, it wouldn't make economic sense to automate. And if the equivalent number of workers replaced by automation were required to build the machines and systems, there would also be no point in automation.

Still another myth has to do with relocation — the idea that workers displaced by automation in one part of the country can find jobs in other parts of the country. This doesn't hold up either, for the truth is that most displaced workers are those least able to move — the lower paid, the older, the unskilled. Either they don't have the money to pay for a move or they are psychologically incapable of beginning new lives in strange areas.

Now in the light of those myths let us look briefly at the employment situation as it is actually developing in the States. As you have probably heard earlier in the conference, at the present time in the United States, our unemployed workers total more than 4,300,000. According to the very latest government count, 2,400,000 of these workers have been unemployed so long that they have exhausted all

of their unemployment compensation benefits. As I've said, we are adding to our unemployment totals at the rate of about 40,000 a week or 160,000 a month, or nearly 2,000,000 a year. Many millions have been forced into involuntary retirement for lack of work or have failed to qualify for unemployment compensation, or — if they are youngsters — have never worked at all. Their plight is what Secretary of Labor Wirtz has described as the "human tragedy of life without opportunity".

These figures become even more frightening when we consider that our labor force during this decade will grow by some six million persons under the age of 25. That is a Labor Department estimate. By comparison, in the previous decade this growth of the young labor force totaled only 400,000. Compounding the dilemma further is the unfortunate fact that simultaneous with this growth in the young labor force, the job market for youth is shrinking rapidly. Right now unemployment in the States among those under 25 is twice the national average. Our Labor Department estimates that some 7,500,000 young people in the labor market of the 1960's will not even have a high school education and will therefore be seeking *unskilled* jobs precisely at a time when the number of available unskilled jobs is declining — thanks largely to automation.

Small wonder, then, that our Attorney General recently told a House Labor Committee in Washington that "a whole new lost generation is growing up in our country, with no skills and little hope".

Obviously it's an understatement to say that to solve this enormous problem is going to be hard. Secretary Wirtz has said that to provide jobs for the young people entering our labor force, and also to replace the jobs being taken over by machines, we will have to find something like 60,000 new jobs every week — or 3,000,000 a year. He also emphasized that the growth rate in jobs has been steadily dropping at a time when the growth rate in the labor force has been accelerating. In the decade from 1947 to 1957, new jobs of a non-farm variety were created at a rate of about 900,000 a year, while in the five years from 1957 to 1962, the annual new job growth rate dropped to less than 500,000. In other words, the new job growth rate was nearly cut in half.

Now all these figures may be frightening to you and to me, but I must repeat a point I made earlier: that to many businessmen they

aren't frightening at all. I honestly think that the great majority of businessmen don't realize — or they refuse to accept — the economic and social consequences of growing technological displacement unless it directly affects their business. And I can understand this. Most businessmen quite properly tend to read statistics in the light of their own profit and loss statements. Unless their sales and profits are down, they find it difficult to see how the employment statistics relate to them. But the clear truth is that sooner or later all of us, including these businessmen, are going to have to face up to the fact that continued mass unemployment and resultant loss of purchasing power by millions of citizens will eventually hurt not only individual businesses but our national economies as well. There is a basic economic law which must be applied here — that reduced purchasing power equals unsold goods equals further unemployment equals still less purchasing power.

Even among businessmen who do see the gravity of the situation, I have perceived two growing tendencies: one is to protest government's entry into the picture, to tell government to keep hands off; the other is to rely completely on government to produce the magic solution to all our problems. In my view both are quite wrong. It seems evident that industry alone won't be able to solve the enormous problems that technological change is creating and will continue to create in coming months and years. The task is just too big and too tough for any one sector of our economy to handle. Our Foundation on Automation and Employment, for example, is only a token undertaking when viewed in relation to the magnitude of the problems we face. And I submit that the same could be said of such apparently major governmental efforts as our Federal Manpower Development and Training Act and the Area Redevelopment Act. If we are to find solutions, I believe that labor, industry, and government are going to have to work more closely together than they have ever done before — and further, they are going to have to focus great imagination on their task.

In the coming months and years, it seems certain to me, as I've said before, that genuine innovations, really new sociological and economic ideas are going to be needed if we are to solve the problems we face in this area. Therefore I submit that we will have to put a very high premium, or top priority, on free-wheeling imagination and creativity as applied to our national economies. No single new thought

should be discarded because at first glance it looks outlandish or because someone calls it radical. After all, this is a rather outlandish age we are living in. And conferences like this should serve the basic function of bringing such new ideas to light — whether we endorse them or not.

By way of illustration, and without my personal endorsement, let me tell you about some notions I've read about lately — notions that have stayed with me.

A couple of weeks ago at the annual conference of the American Political Science Association, Professor Andrew Hacker of Cornell said flatly that he was worried about an automation "revolution". "It may well be that two Americas are emerging," he said, "one a society protected by the corporate umbrella and the other a society whose members have failed to affiliate themselves with the dominant institutions." He said that this "second America" will consist partly of small businessmen: "But, more importantly, it will be comprised of the unemployed, the ill-educated, and the entire residue of human beings who are not needed by the corporate machine." This is the group he feels may rise up. He also feels that "this revolution — with or without violence, whether from the left or from the right — will only be averted if the corporation can make room in its environs for those who demand entry. Has it the jobs, the resources, the will, and the imagination to achieve this?"

It seems to me that the professor's fears deserve thinking about. So do the views of a British-born economist named Robert Theobald, who has gone so far as to predict that a time will come when we will be paying people for *not* working. He thinks we need what he calls an "economic security plan," and he has proposed "the establishment of new principles, guaranteeing incomes for everyone, specifically designed to break the link between jobs and income." He also feels that "implementation of these principles of guaranteed incomes must necessarily be carried out by the government as the sole body concerned with every member of society and with the adequate functioning of the socio-economic system". According to Mr. Theobald, this so-called "due-income from government should be given as an absolute constitutional right".

As I've said, I don't personally endorse these views. I do endorse strongly the principle that we must pay attention to all such state-

ments, try to keep some sort of open mind about them, and air them in public. For I believe that entirely new concepts are going to be needed before we can solve the huge problems that are following in the wake of technological change.

This is not to say that the work we are doing now isn't good and necessary. In Washington, all sorts of bills have been proposed. The list is long, and we may like some of these proposals and not like others. Historically, it has been government's role to encourage our citizens to learn, to help them provide for themselves, and to bring our manpower resources to bear on the jobs that needed to be done. Both our Manpower Development and Training Act and the Area Redevelopment Act belong in this mainstream of history, and undoubtedly, new legislation will be passed that will be designed to help us to cope with automation's challenge.

But as I've said, I believe that more than this will be necessary. To date, it seems to me that our responses to the social and economic challenges of our time have been as erratic as the technological changes that produced the challenges. Our responses seem to follow behind; we haven't been able to see ahead. And this human failure has tended, I think, to aggravate our crises.

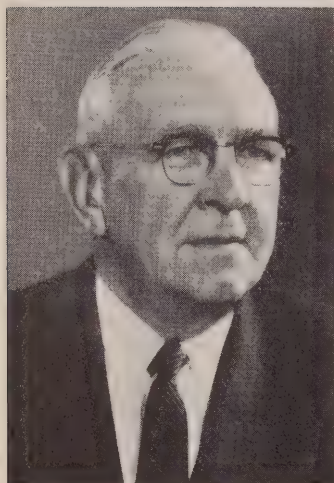
What we need is vision — as in forecasting weather, we should be able to pinpoint a low pressure system before it causes a storm. We must learn to extrapolate our present statistics so that we can look into the future. Then we must see to it that labor, industry, and government work together as never before — and we must somehow come up with new ideas for them to work with.

And all the while we must remember that we are living in a world where man's ability to make and use new tools has also given him the ability to change the world. Whether he changes it for the better or for the worse depends not so much on the tools themselves as on the way he uses them. And the uses to which man puts them depend largely upon the depth of his sense of social and moral responsibility. In the final analysis, this is what determines his ultimate goals.

There is absolutely no doubt that automation will change the world. But its ultimate effect on the welfare of the people of Canada and the United States hasn't yet been determined. This decision, happily, is still ours to make.

THE CHALLENGE OF AUTOMATION

by A. J. HAYES



Mr. Hayes was born in Milwaukee in 1900 and attended the the University of Wisconsin. Currently president of the International Association of Machinists, he is a vice-president of the AFL-CIO. From 1950 to 1951, he was special assistant on manpower for the U.S. Department of Defence. He is co-chairman of the American Foundation on Automation and Employment, Inc., and a board member of the National Bureau of Economic Research.

I sincerely appreciate the honor of being here — and the opportunity to discuss a problem which burns — with equal intensity — on both sides of the 3,986 mile boundary that runs between — but happily does not truly divide — your country and mine.

After studying the very full program of this conference I would say that since Monday morning you have heard and analyzed and discussed just about all the possible economic, technical, social and human implications of automation.

In view of the time you have studied this subject — and the many learned speakers to whom you have listened, I doubt there is much I can say to you that would be new or startling or unexpected.

Let me assure you, however, that I have not come to offer you any quick panaceas, easy answers or mental tranquilizers. I don't

know what the general consensus of previous speakers has been but in my estimation — based on what I have already seen — I believe that automation presents your country, my country — and eventually every country — with a threat and challenge second only to the possibility of hydrogen warfare.

In the past, there has been some tendency to underrate and deprecate the seriousness of automation's implications for mankind. For many years economists, industrialists and government experts in the United States generally kept reassuring one another that automation was just a logical extension of mechanization and that, like mechanization it would create more jobs, more work, more prosperity and more satisfaction for the human race.

In fact, not so many years ago, anyone who tried to warn that automation held as much threat of human redundancy as of material abundance was likely to be ridiculed and even reviled.

Today, however, a lot of people are finally beginning to realize that automation is not just a new kind of mechanization — but a revolutionary force capable of overturning our social order. Whereas mechanization made workers more efficient — and thus more valuable — automation threatens to make them superfluous and thus without value.

I am sure the evidence to support that statement has been presented to this conference — and probably in very graphic and dramatic terms.

Therefore, I do not think it is necessary — at this late stage in the proceedings to review the frustrating record of unemployment, displacement and community dislocation — nor to describe the human and social wreckage that is resulting from what one expert has called the “head-on collision between advancing automation . . . and a tidal wave of manpower”.

Suffice it to say that in the United States the army of the unemployed — what we might call the walking wounded in the onslaught of automation — is now almost as great as the total population of Chicago and Los Angeles. In Canada, total unemployment is greater than the total population of Vancouver.

Generally, your economy goes pretty much in the same direction as ours. Therefore, it should give you little comfort to know that

according to current projections it looks like by 1968 the United States will have the equivalent of the total population of New York, Chicago and Los Angeles unemployed.

In view of these trends and projections, it is obvious that we need not go on merely defining and analyzing the problem, or proving its existence. To the contrary, our need now — the need of industry, government and labor in both the United States and Canada — is to find answers to the very serious new questions that automation raises.

These questions are of a broad scope — and infinite variety. The most immediate, of course, is how to cushion the impact of technological advance on individuals and communities that are in automation's direct line of march.

But ultimately we may be faced with even more difficult and fundamental problems. How, for example, shall we maintain human dignity — and, provide each man with the sense of personal worth that is necessary to all men — in a technology which threatens to need very few men?

And how, also, will we insure that every family will have enough purchasing power to meet its own needs — as well as the need of industry for consumers — if automated machines take the place of the worker — and deprive him of his wages — in the mills, factories, mines, offices, banks, warehouses, farms and stores of our two countries?

Unfortunately, we have not yet reached a consensus on even the first and most immediate of these problems. The difficulty of reaching such a consensus has been compounded by the unwillingness of some industrial managers to accept responsibility for those whose livelihood is destroyed by technological advance.

Lest you think this is an exaggeration, let me tell you that not too long ago, I noted — in the leading journal of a major industry — that 76% of a group of corporate officials subscribed to the principle — as a basis for bargaining — that, and I quote "The company is entitled to *all* of the savings resulting from the introduction of labor-saving equipment".

Such a contention is, of course, patently absurd.

In both Canada and the United States, technological achievement is rooted in long established systems of public education.

Without such educational systems — to which all the people contribute — there would be no technological progress.

Secondly, in the United States — and I imagine in Canada as well — technological progress is generated by public support of scientific research and development programs in governmental, academic and industrial laboratories.

In fact, of the 12½ billion dollars that is being spent annually for all research and development in the United States, more than 7 billion dollars comes directly from tax monies that are paid by all the people.

Thirdly, our heritage of scientific knowledge has been handed down by succeeding generations of artisans and skilled workers and comes from the countless contributions which they, themselves, have made in the workplace.

This heritage of skill and know-how belongs to the people as a whole and must be used in the national interest.

Over and beyond these considerations of reason and justice, if management successfully enforced a claim to *all* the benefits and savings made possible by automation, it would commit economic suicide in the process.

In dealing with automation, the fundamental economic principle from which we must proceed is that workers are consumers and that it is pointless to plan automatic factories capable of pouring out endless streams of goods without also planning an economy in which those goods can be distributed and consumed by human beings.

Fortunately, an increasing number of employers and government officials are beginning to see the light. One of the most enlightened — and one of the first to blaze a trail — is the man with whom I am proud to share this platform tonight. John Snyder's effort to get to the heart of this problem through the Foundation on Automation and Employment is not only a humane approach but good economics as well.

If more employers were as concerned with men as with machines — many of the bitter disputes between labor and management — in-

cluding those that have taken place this year in the longshore, newspaper and railroad industries — would never have occurred.

It is freely acknowledged that these — and many other expensive disputes — have their roots in automation and the fear of technological displacement.

If nothing else — the spread and the threat of more such expensive and time-consuming disputes — have at least forced industry and government to take a second and closer look at the implications of automation.

Recently, for example, President Kennedy announced his intention of appointing a Presidential Commission on Automation. In doing so he quoted the Presidential Railroad Commission which declared that “Revolutionary changes even for the better carry a high price in disruption that might exceed the value of the improvements”.

A key figure in our House of Representatives, Majority Whip Hale Boggs, has called for a White House Conference on Automation, saying that “the tide of industrial revolution is engulfing us”.

Last winter when a group of us from the Foundation on Automation and Employment met with David Morse, Director General of the I.L.O., he made it clear that this problem is not just an American problem or a Canadian problem but a world problem.

He told us, for example, that even in the European Economic Community — where there has been a boom and a labor shortage — they see the handwriting on the wall — and they are already establishing social safeguards designed to minimize the future impact of automation on people.

Since the extent, seriousness and scope of the problem is now being recognized the next question is what — if anything — can be done about it? Well, there are no easy answers, but certain trends — and solutions — are beginning to emerge.

For example, in most union negotiations today it is generally expected that the contract will contain one or more provisions relating to advance notice and consultation, reduction of the work force by attrition, transfer rights (including moving expenses), retraining, employee adjustment services, wage rate retention, early retirement and severance pay.

To some extent, through such provisions, the union can and does protect the worker already employed.

But what about the worker without a job — especially the youngster out of school who, because of automation and high rates of unemployment cannot even get a foothold in the labor force? It is in this group that we already have our largest proportion of unemployment — and one of our highest potentials for social disintegration.

Obviously, no one yet knows what the full answers are in this area — and I do not pretend to. But, in seeking to adjust to a situation where fewer and fewer people can turn out more and more goods in less and less time — it seems evident that one fundamental change we will have to make in our society is to reduce the number of hours an individual works — not merely in a day, a week, or a year — but in his lifetime.

Certainly we need a shorter work week — and despite the roars of outrage in the conventional world of business as usual — I suggest it is quite possible that by 1970 the 35 hour week will be considered not too short but too long.

I suggest that in response to automation we will have to learn to schedule — and to use — more leisure time in the form of more holidays, more long week-ends, more vacations and more sabbaticals for more people.

I would also suggest that eventually we must provide more and better educational opportunities for our youth. If the experience of the past is repeated we can expect that 8 out of every 10 youngsters now in grade school will not complete college.

Some will not have the inclination. Some will not have the ability. But some with both the inclination and the ability will simply not have the money. And yet it is painfully evident that a high school diploma isn't enough in a world of automated technology.

The fact that millions of untrained jobless youths can be found -- idle and aimless -- on thousands of street corners in the United States — testifies to the need for schools specially designed to bridge the gap between high school and college.

For some, such publicly supported schools would serve in lieu of junior colleges — providing basic training in the liberal arts. For

others they would serve as an advanced technical institution — providing kinds of formal training that are in short supply even today — training for example, in data processing, programming, computer mathematics, industrial electricity and electronic theory.

The point is that our present 12-year system of education simply dumps hordes of raw and unready youths upon a job market that neither needs nor wants them.

The establishment of advanced technical institutes — comparable to junior colleges — offering at least two and perhaps even four-year programs — would not only stem the early flood of unready job seekers, but would provide our burgeoning technology with badly needed skills.

At the other end of the age and employment scale, we must — of necessity and before too many more years have passed — make it possible for workers to retire on decent incomes at 60 or even 55 years of age.

In summary, then, much of the sting of automation can be removed both for individuals and for our society by providing adequate protection for those directly in the path of automation — and by reducing the total hours each individual works in his own lifetime.

I realize that thus far these suggestions are purely defensive so let me say that we can also take the offensive — that we can use the added production made possible by automation to meet the many obvious needs of our society — such needs, for example, as more and better housing, schools, hospitals, parks, playgrounds, recreational facilities, clinics, youth centers, roads and airports.

Despite automation — or perhaps even *because* of it — we must develop new industries, new products and a more vigorous trade between nations.

So the future need not be entirely black. Automation has its perils. But it also has its promise.

From the dawn of human history — from the caves where men first huddled by their fires — the dream of mankind has been freedom from want. For thousands of years such freedom — for the overwhelming majority — was not possible. Even today more than three fourths of the world lives in almost hopeless poverty.

But today — something has changed. Man holds in his hands a set of keys with which it is possible to open one of two doors. The first leads to abundance through rational planning. The other to economic chaos.

The question is which door will we open? Unfortunately, even at this late date we do not yet know.

Strong forces continue to wage a short-sighted and suicidal fight against efforts in both your country and mine to meet the problems of changing technology.

Often, the spokesmen for these forces oppose government counter-attacks on unemployment and economic stagnation — on the basis that the law of the market place — the law of supply and demand — should prevail over all other social, economic and human considerations.

This is not only an unreasoned reaching out for the law of the jungle — an appeal to the claw and the fang — but undermines the very foundations of a democratically governed, free enterprise system.

It is truly ironic that so many otherwise intelligent businessmen have to be dragged — clawing, scratching and screaming — into a world of rationally organized abundance.

In conclusion, let me say that what I have tried to do — within reasonable limits of time — is define the nature of the problem, the nature of the solution — and the nature of those whose reaction to 20th Century problems is to retreat behind a Maginot Line of 19th Century ideas.

At times the outlook appears grim and the outcome seems uncertain. And yet so long as we have men like John Snyder — and governments like the Provincial Government of Ontario — in other words so long as we have men and governments with enough concern to plan for the future — we can hope that despite the challenge of automation we will succeed in conserving for future generations the key values of our society.

PANEL:—GOVERNMENT LEGISLATION AND MANPOWER TRAINING

C. R. FORD



Mr. Ford is director of technical and vocational training of the Federal Department of Labour in Ottawa. Although he was born in Ontario, he attended Teacher's College in Calgary, and later graduated from Bradley University in Illinois and the University of Minnesota. He is also a holder of an honorary doctor of laws from the University of Alberta. Before coming to the Federal Government he was a school principal and school superintendent in Alberta.

All the events and discussions of the past days about automation, technological change would be a useless exercise, if as a result no adjustments were made to help society adjust to changing conditions. The success story of the application of scientific discovery, resulting in the technological changes, is leaving in its wake, a backwash of knotty economic and social problems affecting both urban and rural people.

Although the Federal Government does not have direct responsibility in the field of education or training, it does have an interest in the product of the schools and training programs, that is, when the product becomes the nation's labour force. Its interest is in developing the fullest potential of each individual.

The Federal Government, as well as the provincial governments, have provided assistance in the field of technical and vocational

education for many years. However, the changing conditions of employment, technology, production practices, which have tended to push the overall skill level of employment upward and leave a serious unemployment problem, prompted the Federal Government to take a close look at technical and vocational training legislation with a view to making more adequate provisions to meet the changing training requirements of the labour force.

Before outlining the legislation, I would like to discuss briefly the Federal Government's concept of technical or vocational training or, as it may better be described, manpower development and training.

This whole area is viewed as one whole indivisible total problem. All the programs and techniques used to develop technical, trade or occupations competence are merely devices required by different persons or groups in their efforts to develop and improve occupational competence and productivity.

The Canadian technical and vocational training program has as its objective the development of the skills, the abilities, the understandings, the attitudes and working habits of each member of the nation's labour force.

This total program is viewed as a balanced program of formal, related or technical studies and work experience designed to produce competent workers.

Under the pressure of rather serious conditions, the government, in 1960, introduced, and Parliament passed, the Technical and Vocational Training Assistance Act. The impact of this legislation has been more far-reaching than any of us could have dreamed or hoped. Although it deals specifically with technical and vocational training, it has had a much broader impact.

This legislation defines technical and vocational training very specifically as being,

“any form of instruction, the purpose of which is to prepare a person for entry into gainful employment in any primary or secondary industry or service occupation, or to increase his skill or proficiency therein in any of the following industries or occupations”.

The occupational fields embraced by the legislation include agriculture, fishing, forestry, mining, commerce, construction, manufacturing, transportation or communication, and any other primary or secondary industry or service occupation requiring an understanding of the principles of science or technology, except where such instruction is designed for university credit.

It very clearly spells out that the federal financial assistance under this legislation can only be provided, and may only be used for those training programs which have as their objective the preparation of persons for entry into gainful employment or for increasing the worker's skill or proficiency in gainful employment.

The legislation is implemented by two federal-provincial agreements:

1. the basic agreement — The Technical and Vocational Training Agreement, and
2. The Apprenticeship Training Agreement.

In the broadest analysis the training programs which have been developed and for which assistance may be provided, are divided into three main groups:

1. those youths who are continuing with their general education and who are developing occupational competencies in technical or vocational or composite high schools before they enter the labour market;
2. those post-high school technical or technological training programs having a content of mathematics, science or theory beyond that taught to the junior matriculation level;
3. training programs for adults for persons who have left the regular school system either before or after completing it. In this latter group could well be grouped those persons who pay a fee, the training which is done in industry, the training for unemployed, the training for disabled, the training of apprentices, and the upgrading evening classes.

However, so that all segments of the labour force would be identified, and for the purpose of drawing particular attention to a number of segments or groups which require special attention, the

basic agreement which implements the legislation identifies 9 or 10 different areas or programs.

Program 1

This program identifies that characteristically Canadian program of technical and vocational training which is offered as part of the high school program. It requires that a minimum of 50% of the student's school time be devoted to preparing for entry into gainful employment. However, the content of this 50% of school time may include the technical, trade or occupational practice and theory as well as the mathematics and science and other related subjects which comprise a vocational curriculum.

Under the surge of development during the last two and a half years, the construction of approximately 300 new technical and vocational or composite high schools or major additions have been undertaken and completed, thereby providing approximately 105,000 new student places.

Program 2

Program 2 is the post-high school technician training program. This program covers a great variety of fields, including engineering, science, business, medicine, agriculture, or any other field requiring advanced theoretical or practical training, provided the training program covers approximately 2,400 hours of instruction and is not designed for university credits.

Since December 20, 1960, 11 new schools offering programs at this level have been developed in Canada.

Program 3

This program identifies the trade or other occupational training programs for persons who have left the regular school system either before or after completing it. This program is designed to assist adults to develop or upgrade their skills; to prepare for entry into gainful employment or to progress therein, or it may provide training for those individuals wishing to train for a change of occupation. Although adult vocational education has not in the past been an important feature of the Canadian pattern, there has been an extensive development of facilities at this level and for this group in practically every

province. In all, 46 new adult vocational training schools and 70 major additions to existing schools have been completed providing for approximately 18,000 additional students.

Program 4

This program also provides training for adults. It is designed to promote and assist training programs in cooperation with industry. This area to date has been inadequately developed in Canada. The program is designed to provide for the training of supervisors and upgrading or retraining of persons who are employed. It is not intended as a substitute for apprenticeship. It is, rather, intended for those other training programs and services which are required by workers in industry to enable them to keep abreast of changing occupational requirements.

Program 5

This program identifies the training which may be provided for persons who are unemployed. The program may be used to improve their employment opportunities by increasing either their basic education or their trade, technical or occupational competence.

The program is in operation in all provinces and during 1962-63, approximately 38,000 persons were trained in over 100 occupations in 220 centres. Enrolments in this program have been as follows:—

1950-51	2,232
1955-56	3,100
1960-61	10,774
1962-63	38,380

(It should be pointed out that different programs are identified by a number as the financial provisions or the contribution of the Federal Government differs between programs.)

Program 6

Program 6 identifies the training program which provides training for disabled persons. Individuals who, because of a continuing disability, are unable to pursue either former employment or available

employment may be trained or retrained for suitable occupations. 2,968 persons received training under this program in 1962-63.

Program 7

This program provides a very essential service. It is under this program that the technical and vocational teachers, supervisors, and administrators may be trained. Since 1960 over 3,000 new teachers have been trained in full-time and summer sessions. Two European study tours for administrators have been organized. The requirement for this program will continue to increase as long as there is a requirement for training.

Program 8

This program authorizes the Federal Government to reimburse the provinces for 100% of the costs of training any workers who are in the employ of the Federal Government.

Program 9

This program provides for a limited amount of student aid or financial assistance to students attending university. The financial assistance for this program is limited by a very strict quota.

Program 10

Although there is no program 10 in the Agreement, there should be. This section of the agreement provides for the Federal Government to share equally with the province in the cost of preparing printing and servicing of approved vocational correspondence courses.

Capital Expenditures Program

Another section of the agreement which might well have been identified as a program and given a number is the "Capital Expenditure Program". It is this section of the basic agreement which has given the dramatic impetus to the development of new technical and vocational facilities and in fact to a changing emphasis in education in Canada. Under this program federal financial assistance is provided for the construction and equipping of approved facilities for all programs, whether for the training which is given as part of the high school program, or the training of technicians in the post-high school

program, or the training of adults who have left the regular school system, whether they are unemployed or disabled, or are apprentices, or persons who wish to pay a fee.

Apprenticeship

Although apprenticeship is dealt with under a separate agreement, it is in effect merely a device having particular characteristics, designed to develop occupational competence in designated trades to a predetermined level, or rather, to journeyman status.

Apprenticeship Agreements have been in effect in most provinces for twenty years. The numbers in the program have grown steadily until at the present time there are well over 21,000 apprentices registered in the programs in nine provinces.

These different programs which I have mentioned comprise the total public technical and vocational training program in Canada' and under these various programs instruction may be offered in full-time day classes, part-time classes, by day release or block-release, by sandwich courses, correspondence courses or by any other technique which may successfully be used to impart instruction and develop occupational competence.

Financial Provisions of T.V.T.A.A.

Before leaving federal legislation, it might be well to mention the federal financial contribution towards the support of the total program. From December 20, 1960, until the 30th of September, 1963, the Federal Government agreed to reimburse the provincial governments for 75% of their expenditures upon approved technical and vocational training buildings or equipment, provided that the contracts for construction were let and equipment was ordered before the 1st of April, 1963. In all, something over 525 projects have been approved, involving a total capital expenditure of almost 520 million dollars and a federal contribution of 329 million dollars, thereby providing for 140,604 additional student places.

It should be mentioned that the present government has announced its intention of continuing the 75% contribution towards the construction and equipment of approved technical and vocational training facilities until each province has claimed from the Federal Government an amount equal to \$480 for each person in the 15 to 19 age group as determined by the 1961 census or until March 31st,

1967. After \$480 has been claimed as mentioned the federal contribution towards buildings and equipment will be 50% of provincial government expenditures.

Operational Costs

The Federal Government's contribution towards operational costs of **Program 1** is limited by a quota. Three million dollars is provided annually and for distribution among the provinces chiefly on the basis of the 15 to 19 age group.

For all other programs, that is, the training of technicians, the training of adults, the disabled, vocational teacher training, etc., the Federal Government reimburses the province for 50% of provincial government expenditures on approved training projects, with the exception that for the training of unemployed under Program 5, the federal contribution is 75% of provincial government expenditures and recently the government increased its contribution to training allowances for the unemployed to 90% of provincial government expenditures. A 75% reimbursement of provincial expenditures is also to be provided for three areas of training in industry, viz., apprenticeship, basic training and skill development, and retraining programs for workers who would otherwise be displaced.

So much for the physical and legal aspects of this program.

The impact of these developments are more far-reaching than anyone anticipated. The level of enrolments in most of the new facilities in Canada are continuing to be higher than any of us could have dreamed in our wildest projections. Schools which formerly had hundreds in their enrolment now find that there are thousands clamouring to be admitted to courses.

But training programs alone do not meet the needs in an era of rapid technological change. Automation and other industrial changes frequently require difficult and far-reaching manpower adjustments of the individual, the plant and the community level. Occupational and geographic shifts must often be made if unemployment is to be avoided.

Several speakers have drawn attention to the very complex employment adjustments which technological change makes necessary. They have emphasized that these adjustments need careful attention and planning so that serious hardships are not imposed on individual workers.

This is basically a task for labour and management but there are contributions government can make. With this in mind the government has announced its intention of establishing a Manpower Consultative Service.

This Manpower Consultative Service is to be established within the federal department of labour. This will be a new organization, responsible for assisting in the development of manpower adjustment programs, to assist, advise and encourage, the establishment by employers and workers of such programs in industry. This service will encourage and coordinate the use by industry, of training programs, of placement, and the services of other organizations which can assist in bringing about effective manpower adjustments.

A Manpower Adjustment program can be many things. It can include many kinds of specific measures. There are some things which should always be included.

1. An objective assessment of the impending impact of a technological change upon an organization, and this should be done at the earliest possible date.
2. An action program jointly developed and undertaken by labour and management which may include:
 - (a) An orderly preparation and transfer of workers to new jobs within an organization.
 - (b) The upgrading or raising of basic educational qualifications of workers who need further education to keep pace with technological change.
 - (c) Retraining of workers for other occupations where employment opportunities exist.
 - (d) Assistance to workers who must move to jobs in other areas.
3. Counselling of workers to help them understand and adapt to changing conditions.

It is planned that this consultative service will assist management and labour to assess the effects of automation and other technological changes as a basis for developing suitable programs of manpower adjustment provided there is a reasonable advance notice

given of industrial change. The government's Manpower Consultative Service will be able to provide assistance in the costs of research as a first step in developing a manpower adjustment program in industry, provided such research is jointly sponsored by industry and labour. It will also authorize the provision of mobility or re-employment incentives by assisting in the transportation or relocation of workers who are displaced by industrial change. In addition it will help to mobilize and coordinate all of the government services which can help resolve a manpower adjustment problem created by technological or other changes.

Before closing, I would like to mention another federal program which is closely related to manpower development. For a number of years a skilled manpower training research committee has given direction to a continuing program of manpower training research. This research is designed to shed light on two major aspects of technological change: first, its general effect upon employment and output, and some of the particular effects on occupations and skill requirements.

As part of the work of this committee, field studies have been carried out in 6 industries; the impact of a number of major technological changes has been studied, for example, the introduction of electronic data processing in a large Canadian insurance company was followed through all stages of installation and much detailed information was obtained on the manpower and other changes which occur when office procedures are mechanized.

Other surveys determine the ways in which selected groups of specialized workers acquired their skill. Detailed reviews were made of the existing public and private training facilities in Canada, and investigations studied the past and future occupational trends on a national and an industrial basis, and a study has also been made of the transition of youth from school to the world of work.

This research material provided much of the background data for the development of the Technical and Vocational Training Assistance Act.

In evaluating the magnitude of the present manpower development and training program, the total expenditure on capital facilities could be cited. This, as has been mentioned, has been in excess of half a billion dollars. The student capacity of the vocational schools

in Canada has been doubled. There has been an extension of the post-high school technical training to all provinces except Prince Edward Island. The Federal Government expenditures on Technical and Vocational Training increased from 8.5 million dollars in 1960-61 to 208 million dollars a couple of years later.

However, in spite of extensive expansion the most important and most encouraging aspect of the total exercise is the serious attention which has been given by the leaders in the field of education and training to the development of high-quality programs at all levels and the development of a suitable articulation between the different programs.

Since we have been assured that the Federal Government will introduce legislation to continue the contribution of 75% of the cost of vocational facilities and equipment until 1967 or, as I mentioned, until \$480 has been claimed for each member of the 15-19 age group, a projection of what further expansion might take place over the next three and a half years has been made recently.

Whereas today technical and vocational training facilities of Canada provide training places for approximately 250,000 students, in 1967 accommodation will be required for and must be provided for 490,000 students or approximately double the facilities which are available in Canada today.

Although much has been accomplished during the past two and a half years, there are still many unresolved problems. Manpower development is a national problem. Its requirement reaches across provincial boundaries, it knows no political jurisdiction, and thousands of municipalities and ten provincial governments find it difficult to work effectively when dealing with problems that are national in scope.

There is an increasing requirement for much more specific direction of the program by the competent authority in each province. We have not accomplished a great deal in the matter of standards. The apprenticeship program has shown the way in this matter, for it has established inter-provincial standards in a number of trades. There is no such a national or interprovincial standard at either the high school level or the post-high school technical level, and with a work force which is as mobile as that of Canada, this makes no sense at all.

We have standards in foods and drugs which are rigidly enforced. Does it matter so little what goes into minds in comparison with the stomach?

Probably one of the greatest difficulties is the development of modern concepts about the responsibility and scope of a manpower development program. Such a concept dictates the need for a wide range of facilities and programs at the adult level and for a continuing process of training from adolescence to retirement, to include training or retraining two or three times, as required, during a person's working life. And there is still the tendency for what might be termed "competing agencies" fragmenting the total program of manpower development into a number of small segments and thereby weakening the total program.

This is a brief review of the federal legislation and federal-provincial agreements. It represents the current thinking as to the legislative needs for manpower development and training. When new concepts or needs are identified I hope the federal program will be adjusted accordingly.

L. M. JOHNSTON

A graduate of Peterborough Normal School, Queen's University and the Ontario College of Education, Mr. Johnston is superintendent of the technological and trades training branch of the Ontario Department of Education. He taught 10 years, was a secondary school principal 11 years and was appointed a secondary school inspector in 1959. In May and June, 1963, he studied manpower training and development in England, West Germany, Sweden and Russia.



In dealing with my portion of this topic I propose to discuss briefly some of the various programmes of the Federal-Provincial Technical Vocational Training Agreement, the related Provincial legislation and the extent to which the Department of Education has utilized the various programs.

Under program 1 (Secondary Schools) from the beginning of the agreement to August, 1963, 241 building projects have been approved to provide 125,810 pupil places at a cost in excess of 280 million dollars. The 241 projects may be summarized as follows:

New vocational schools	32
Additions to vocational schools . . .	15
New composite schools	32

Vocational additions to composite schools.....	54
Vocational additions to high schools	108
	-
	241

In all 131 school boards have been or are involved in this expansion of technical and vocational facilities with 93 boards providing this type of education for the first time.

In connection with the 280 million dollars involved in the cost this has been shared by the two senior governments on the basis of 75% from the Federal Government and 25% from the province with the exception of approximately 16 million dollars which was not approved for Federal participation. This has been handled under the general provincial legislative grants where the percentage paid by the province varies according to a scale based on such factors as assessment per capita and population per municipality.

To utilize these facilities in September, 1962, the Reorganized Program for Secondary Schools was introduced into Grade 9 in more than 85% of Ontario's secondary schools. Some schools are not yet large enough to make use of the diversifications which the new plan provides; others are continuing their classes in Grade 9 on the former plan and will inaugurate the Reorganized Program beginning in Grade 10.

In September, 1963, it is anticipated that more than 90% of the classes in Grade 9 will follow the revised plan and that almost 100% of the Grade 10 pupils will be classified in one of the three Programs: The Five-Year; The Four-Year; or The Occupational Trades. The Five-Year and The Four-Year Programs will be available to pupils of most large schools in all three Branches: (1) Arts and Science; (2) Business and Commerce; (3) Science, Technology and Trades. Pupils entering Grades 11, 12 and 13 in September, 1963, will finish their secondary education on the continuing programs formerly used.

The first indication of the effectiveness of the revisions in organization may be noted in The Diversified Occupational Trades classes where pupils were first enrolled in 1962. The schools which established these classes have already found their accommodation insufficient to meet the demand. Both parents and schools officials have accepted

this innovation and have been pleased with the first year of its operation.

In Ontario in 1963-64, approximately half of the pupils in secondary schools will be classified as vocational. The possibility of proceeding from the vocational branches to any form of advanced education is encouraging more of the capable pupils to choose vocational programs.

From the experience gained in the schools during 1962-63, and from further trials in 1963-64, the recommendations for changes in the Reorganized Program courses of study in Grade 9, will be considered by the Department of Education as its officials prepare the courses which will be used for a number of years.

On April 1, 1963, the Minister of Education announced the establishment of the Technological and Trades Training Branch to give direction in the rapidly expanding field of manpower training and in the main to administer the balance of the programs of the agreement.

This Branch is responsible for the general supervision of the institutes of technology and the institutes of trades, for the training of the unemployed for training in cooperation with industry, for advanced technical evening classes and for training involving Federal departments and agencies. In addition to the general operation of the various institutes and programs, the Branch provides leadership in the development of suitable curricula, standards and grades for the various courses, and in the planning, organization, and implementation of suitable training courses for the staffs of the institutes and various training programs.

Program 2 is concerned with the training of technicians and technologists and at the present time Provincial institutes of technology are in operation in Haileybury, Hamilton, Kirkland Lake, Ottawa, Toronto, and Windsor. In 1962-63, the six institutes enrolled 3,985 students in full-time day courses and 5,003 in extension courses. The anticipated enrolment for 1963-64 is 4,650 full-time students and 5,415 in extension courses.

The Ryerson Institute of Technology is now completely housed in new buildings and an enrolment of 4,000 full-time students on a semester basis is possible. Plans are nearing completion for the

operation of the Institute by its own Board of Governors. At that time it will be renamed the Ryerson Polytechnical Institute in order to describe more accurately the purposes of the courses being offered.

The Northern Ontario Institute of Technology moved into its new buildings on March 1, 1963, and the school was officially opened by the Minister of Education on June 5, 1963. This building is now filled to capacity and additional facilities must be provided by the fall of 1964.

Plans are being completed for new buildings for the Hamilton Institute of Technology.

The Lakehead College of Arts, Science and Technology operates under a Board of Governors and offers, in addition to the courses in arts and science, courses in engineering, forestry, and mining technology.

Program 3 of the agreement is concerned with institutes of trades. At the time of the signing of the agreement the Department of Education had in operation one such school—the Provincial Institute of Trades, 21 Nassau Street, Toronto. Since then two new institutes have been opened in Toronto—the Provincial Institute of Automotive and Allied Trades, 25 Wellesley Street West and the Provincial Institute of Trades and Occupations, 37 Dartnell Avenue. Two new buildings are being constructed in London and Ottawa and it is expected that they will be in full operation in 1964. Tenders are being called for the construction of a new institute of trades at Sault Ste. Marie and plans are being prepared for similar schools in Hamilton and the Niagara Peninsula. Research studies are being conducted to determine other centres in which institutes of trades may be built and it is expected that within a few years a complete network of these schools will serve in every way the needs of industry for fully qualified tradesmen and technicians.

These schools are built and operated by the Department of Education and for construction completed prior to October of this year the Federal government has contributed 75%. Thereafter for the lifetime of the agreement the Federal contribution may drop to 50%.

Program 4 deals with training in industry. This is a new field for the Department of Education and is one that has caused a great deal of concern and one to which a great deal of study is being given.

At the present time one experimental project is being conducted in Leaside, Ontario, with the cooperation of the Federal and Provincial governments, three industries, namely Philips Electronics, Minneapolis-Honeywell and Sangamo Electric and their employees. Results, while incomplete at the present time, appear to indicate that a course in basic training for skill development is most helpful in raising the educational standards of the working force. Some thirty employees are involved in the project.

The Federal Government is contributing 50% of the costs of the Provincial Government.

Retraining and upgrading the unemployed falls within the terms of program 5 of the agreement. This program has expanded tremendously in the last year.

For the fiscal year ending March 31, 1962, some 310,000 training days were completed; for the year ending March 31, 1963, the figure was close to three-quarters of a million. It appears now that for the current fiscal year the numbers will be well over the million mark.

Approximately 20,000 people have come under the influence of this program to date with about 6,500 currently in training in 40 skill courses in some 36 centres. It is estimated that 12,000 men and women have found suitable employment as a result of the newly acquired skills.

When the training days for the year exceed 286,000 the Federal Government contributes 75% of the provincial costs. The Department of Education pays all costs involved including such items as trainee allowances, purchase and rental of equipment, instructors and coordinators, salaries, supplies, depreciation on school board owned equipment, advertising etc.

The courses are being conducted in existing school facilities, provincial institutes of trades, rented quarters and in some cases training is purchased from private organizations.

Program 6 is concerned with the rehabilitation of disabled persons and this training is administered by the rehabilitation branch of the Department of Health and Welfare.

One of the concerns of the Department of Education in an expanding system such as I have described is the training of a sufficient number of technical and vocational teachers. The Ontario College of Education is in operation at 371 Bloor Street West in Toronto and

plans are well underway for a new college of education to be constructed in London. Plans are underway with a view to expanding these facilities further. The Federal Government shares in the capital expenditures for such training facilities as are used for technical and vocational purposes.

Program 8 makes provision for the training for Federal departments and agencies and at Dartnell Avenue in Toronto training is given for the Department of Transport for seamen to become mates and masters and marine engineers.

The entire costs of this operation which is administered by the Department of Education are borne by the Federal Government.

There are other details of the agreement which I will omit at the present time and perhaps they will become involved during the discussion.

DR. H. S. BRAUN

Mr. Braun is principal of the Lakehead College of Arts, Science and Technology in Port Arthur. He is a graduate of McMaster University and the Ontario College of Education. After becoming head of the science department at Port Arthur Collegiate he joined the armed services and did special research work on radar during the war. After the war he joined the staff of the Lakehead Technical Institute and assumed his present position when the Lakehead College was established.



Mr. Johnston has reviewed for us the role of the secondary schools in manpower training. Our chairman has asked me to discuss the role played by post-secondary educational institutions in this

field. I propose to devote the time allotted to me to discuss briefly five questions pertaining to this topic.

1. What does post-secondary education in Ontario consist of?

First, may I suggest alternate terminology — a favourite, I believe, of Dr. R. W. B. Jackson, Director of the Department of Educational Research, Ontario College of Education, who is responsible for so many of the statistics we quote in this field. He suggests that since we are already familiar with the terms primary and secondary education, we should now use “tertiary education” to include all post-secondary educational institutions — universities, colleges, technical institutes, trade schools and schools of nursing.

In our discussions, we sometimes create confusion because different people mean different things when they refer to these post-secondary institutions. In an attempt to avoid this, I would like to suggest the following definitions which were put forward by a special committee established by the presidents of provincially assisted Ontario universities.

A *university* is a multi-faculty institution, consisting of a faculty of arts and science and at least one professional faculty. It offers instruction to the Baccalaureate level and beyond that level at least to the Master's and normally to the Doctorate degrees. Universities sometimes offer diplomas and certificates for shorter courses.

A *liberal arts college* is an institution providing under-graduate programs leading to B.A. and B.Sc. degrees, but not normally offering professional or advanced graduate work. In Ontario, some institutions that are normally called universities are really liberal arts colleges — e.g. York and Trent in terms of their present program.

A *junior college* is an institution offering a two-year program beyond Grade XII which can carry a student to a level two years below a general B.A. or B.Sc. degree. Junior colleges do not grant degrees, although in the U.S.A. some of them grant associate degrees in arts, etc.

Incidentally, there are very few junior colleges in Canada. Lakehead College might have qualified for the term up until recently when we expanded to a degree-granting program in arts and science. Mount Royal Junior College at Calgary and the junior college at Lethbridge would be other examples. Perhaps if time permits in the

discussion period we can consider why these colleges have not been more popular in this Province.

An *institute of technology* is an institution offering a two or three-year course beyond Grade XII in various technical and commercial fields and in applied arts. The courses are designed to meet the educational requirements of the large group of able young people whose interests and abilities are pointed towards technological rather than fully professional careers. The courses lead to a recognized status within the field. For example, the Association of Professional Engineers has specified the requirements for an engineering technologist.

An *institute of trades* or a *trades school* offers vocational courses to prepare people for immediate employment either as apprentices in the apprenticeship trades or as technicians or mechanics in certain other trades such as watchmaking and welding. Admission requirements vary with the different courses. They may be as low as Grade VIII or as high as Grade XI. These institutions are well designed for the retraining of adult workers.

Definitions of teachers' colleges and schools of nursing would be superfluous.

2. How is post-secondary education in Ontario organized and financed?

The universities in Ontario are established by Acts of the Provincial Legislature. They are controlled and operated by a Board of Governors, the members of which are usually appointed by the Lieutenant-Governor. As a rule, the Board of Governors is primarily concerned with finance, appointment of senior administrative staff, etc. Recommendations with respect to academic matters are made by the faculty, through the Senate, to the Board of Governors.

The universities in Ontario are supported by a combination of public and private funds. It is the most expensive of educational institutions since it requires a highly qualified staff, a high ratio of staff to students (approximately 1:14), expensive libraries, laboratories, etc. Most of the university teachers are simultaneously engaged in research.

In 1960-61 the sources of revenue for the Ontario universities were as follows:

Student fees.....	29%
Provincial Government....	28%
Federal Government.....	16%
Assisted research funds....	14%
Gifts and grants.....	3%
Endowment income.....	3%
Miscellaneous.....	7%

It is obvious that the major sources of funds are the student fees, provincial and federal governments. All of us are familiar with the tremendous expansion programs which must be carried out in the next few years and the increases in university costs associated with them. They could be met by very substantial increases in student fees, but in doing so, many able students would be barred. We could achieve the same effect by raising the entrance requirements by a very substantial amount so that the expansion would not be necessary — but this plan would never be accepted. The only alternative would seem to be a very substantial increase in government grants at both the provincial and federal levels.

Unlike the universities of Britain, which are frequently condemned as exclusive and some of the universities of the United States which are frequently derided as “diploma mills”, Canadian universities have suffered little real criticism. Canada’s thirty-eight universities are relatively free of the pressures of politicians — probably because none has depended entirely upon public funds for support. This tradition is well entrenched and there is no indication of change today.

Liberal arts colleges are established and operated on the same basis as universities. They may be supported by private or public funds, or both. In Ontario, Waterloo Lutheran University might be cited as an example of a liberal arts college which is largely church supported.

The establishment and control of institutes of technology, institutes of trades and teachers’ colleges in Ontario is entirely different from that of the universities. All of them operate under the Provincial Department of Education, and the staff members are civil servants. The fees which are collected go to the Provincial Treasury and the Province pays the operating expenses. The Federal Government assists with capital expenditures and the purchase of equip-

ment for technical education and 50% of the operating expenses in technical institutes.

I have already referred to the fact that Lakehead College was the first institute of technology to become independent and Ryerson will be the second. On January 1st, 1964, it will become the Ryerson Polytechnical Institute, and it will be operated by a Board of Governors.

In Ontario, practically all of the schools of nursing are controlled and operated by hospitals, although, here too, experimentation is taking place. The Nightingale School would be an example. I might refer also to a scheme we are trying out at Lakehead College. Student nurses from the three lakehead hospitals now take a large part of their academic work at the college. The courses, given by regular Lakehead College faculty, are designed especially for them. The hospitals pay tuition at the regular rate. The plan is in the nature of an experiment designed to run for a period of three years.

A detailed analysis of the method of financing schools of nursing is complicated and beyond the scope of this discussion — suffice it to say that government funds bear the largest portion of the cost.

I have attempted to provide a brief picture of post-secondary education as it exists in Ontario today, and I would now like to turn to my third question.

3. Where do we fall short?

In this audience, I am sure that I need not stress the fact that we fall short in our attempts to provide the number of teachers and the kind of teachers we need in our schools. This is a problem, however, of which the people in this Province are well aware. Almost every step possible is being taken to solve it and while, especially in the higher grades, it may get worse before it gets better, I am confident that it will be solved and it is not our biggest problem today.

We are well aware, too, of the crisis faced by our universities. In 1939, there were five universities in Ontario (Toronto, Queen's, Ottawa, Western and McMaster) with a total enrolment of about 11,000 full-time students.

In 1961-62, there were fourteen* Universities with a full-time enrolment of 30,000 students.

*(Assumption, Carleton, Lakehead, Laurentian, McMaster, Ottawa, Queen's, Toronto, Waterloo, Western, York, O.A.C. and O.V.C., Osgoode Hall, Waterloo Lutheran)

In 1970-71, recent estimates indicate that the enrolment will reach 90,000 students.

To meet this situation existing universities are being expanded and new ones such as Trent, Brock and the two University of Toronto satellites on the fringe of this metropolitan area are being built.

Providing the buildings required for this influx of students will be a tremendous task. Finding well qualified staff will be much more difficult. In this respect, I should like to pay tribute to the extra assistance provided by the Department of Education during the past year to the larger universities to permit the expansion of post-graduate facilities and the grants to students to enable them to take advantage of them, in order to prepare themselves for teaching at the university level. It is one of the most far-sighted approaches on this continent.

Once again, I feel that the people in this Province are well aware of the problem and are prepared to support whatever steps must be taken to solve it.

There is, however, another area in which we fall short, and I do not think it has received nearly enough attention. It comes very close to the subject of this conference "Automation and Social Change". I refer to the field of technological education. Why do we lag in this field? Before attempting to answer this question, and at the risk of oversimplification, let us look at the broad picture. We must provide more jobs. To achieve this goal, we must expand our manufacturing industries, we must increase our gross national product. We must sell what we make — part of it in export markets. Therefore, it follows that we must be efficient. We must derive every benefit from automation that we can. To do this, we require more university graduates, technologists, technicians and skilled workers. To achieve this, a larger percentage of our students must stay in school longer and get more out of it. It seems to be a simple story, but we have not sold it to the students — at least not to a large portion of them.

The problem of drop-outs in our elementary and secondary schools has been discussed previously, and I shall pass it by. I should like to refer to the enrolment in our technical institutes. In 1962-63, there were 4,000 full-time day students in Ontario technical institutes compared with over 30,000 university students. Last year, in Canada,

we graduated approximately 2,400 engineers, but only 600 technologists, yet experience in some of the European countries suggests that we should graduate approximately 4 or 5 technologists for every engineer. We fall short, and we will pay for it in the efficiency of our established industries and our attempts to build new ones.

Part of the reason for our lag in technical education lies in our history. In the 1870's two institutions were established in the Province — The College of Technology at Toronto in 1872 and the Ontario Agricultural College in Guelph in 1874. There was a great deal of argument when these two institutions were being launched as to whether they should be technological or professional. The College of Technology in Toronto began as an evening school for mechanics, but by 1875, it had become the School of Practical Science, affiliated with the University of Toronto and offering a three-year university level course. In 1877, it was physically moved to the Toronto campus, and in due course, it became the University's Faculty of Applied Science and Engineering. At the Ontario Agricultural College, on the other hand, a compromise was sought and achieved. From the start, there were offered two distinct courses — a two-year diploma course and a three-year, later changed to four-year degree course. Both courses continue to be offered to this day, and it can be said that the Ontario system has made provision for both professional and technological farmers since the 1870's. In contrast to this, the decision to convert the College of Technology into a Faculty of Engineering, along with the tendency of the high schools to adopt a curriculum of the collegiate institutes rather than the broader program including vocational education originally intended for them by the Act establishing them in 1871, created a vacuum in the area of vocational and technological education at both the secondary and post-secondary level. The effect is still evident today.

The first man who aroused interest in vocational education in Ontario was Dr. John Seath, Superintendent of Education. He published his report *Education for Industrial Purposes* in 1911. Little was done, however, until federal funds were made available through the Technical Education Act of 1919. Between World War I and World War II, many vocational schools were built, and by 1939, the kind of dual offering envisaged by the 1871 Act was generally available throughout the Province — an interval of some 70 years.

It is unfortunate that no post-secondary technical institutes were established in this Province between 1900 and 1939. Looking

back, it seems quite likely that they would have been built if the technical and commercial elements had been introduced in the secondary schools at an earlier level. In the recently published report of the Select Committee on Manpower Training we read that:

“Historically, we in Ontario have tended to emphasize academic preparation, often at the expense of vocational education and training.”

This tendency has hindered the recognition of industrial specializations and skills and has retarded the development of technical education, especially at the post-secondary level. We have been slow to realize that the increasing complexity of commercial and industrial enterprises and the decline of the apprenticeship system were shifting additional responsibilities on to the schools.

The recommendations of the Manpower Training Committee with respect to institutes of technology, trade schools and vocational education in our secondary schools deserve our careful consideration. They recommend that the stream should provide as much basic general education as possible along with broadly based vocational skills, but not the highly specialized skills needed in many fields for immediate employment. The trade school should continue its role in the apprenticeship system but in addition provide a substitute for apprenticeship in the non-apprenticeship trades. The program of the institutes of technology should be greatly expanded. It has been suggested that an expansion goal of 18,000 student places by 1970 might be a realistic one in terms of need. These institutes should graduate large numbers of highly qualified people sorely needed by our industries in order to operate efficiently.

But this is not enough. In addition to providing the facilities, we must conduct a strong educational campaign to convince the students and their parents and especially perhaps some of the industrialists of the merits of this type of education.

I was very interested, earlier this morning, to hear Dr. Ford say that on his visit to Sweden to study Technical Education, he found that the program was so thoroughly integrated with labour, industry and the schools that each group referred to it as “their program”. This is the attitude and awareness we must strive to achieve in Ontario.

There is a great need for planning, coordination and direction by knowledgeable persons in this area. The recent appointment of a Superintendent of Technical Education and the establishment of the Technological and Trades Training Board of the Department of Education are important steps in the right direction.

And now, my final question.

5. Will the Ontario system of post-secondary education meet the challenge of automation?

I do not know how we can answer this question until we know more about the problems we face. Professor Porter suggested today that in his opinion there are less than 300 people in Canada who have any detailed understanding of the problems of automation. He suggested that the problems of the scientists are "chicken feed" compared with the problems of the social scientists. I heartily agree.

It is imperative that we launch an intensive study program to find out all we can about the effects of automation in this Province. We must then use every democratic means at our disposal to persuade the students and their parents to do what is necessary to meet the problems which lie ahead. We must try to look, 5, 10 and 20 years ahead — examine the current status of important developments and estimate in what direction and with what speed their rate of adoption and diffusion appears to be heading.

Fortunately, we, in Ontario, have inherited a strong educational system — one in which academic excellence and high standards have been the rule. Our system has adapted itself well to changes in the past. Many more changes will be made in the next few years. It is imperative that this be done without surrendering the high standards of service and scholarship which have been preserved for us.

ARTHUR PORTER

Dr. Porter is head of the industrial engineering department at the University of Toronto. Scientist and teacher, he taught instrument technology at the Royal Military College of Science in England from 1946 to 1949, and was also a member of the teaching staff of London and Saskatchewan Universities. Author of "An Introduction to Servomechanisms", he is a member of several scientific councils. He was born in Ulverston, England, in 1910.



Introduction

If Canada is to face the challenge of rapidly developing technology and industrialization, with growing and increasingly intense competition, I believe there will have to be more recognition and understanding of the role of the universities, not only in the education of talented young men and women, but also in the education of top management in government and industry.

I shall preface my remarks by stating a few personal convictions:

1. I believe top management, through lack of knowledge, is far more scared of automation, and its impact on management processes, than the labour unions are. The manager who has little knowledge of his tools (e.g. electronic computers) and how they should be used, is doomed to failure sooner or later.

2. Probably fewer than 300 people in Canada today understand, in depth, the scientific principles of automation and how it is likely to evolve in the future. And perhaps an equal number are studying, in depth, the economic and sociological implications of technological change. Of these 600 or so scientists, engineers and social scientists, I venture to estimate that perhaps 400 are in the universities, 150 are in government service and the remaining 50 are in industry.
3. Large sectors of Canadian industry have failed to recognize the importance of having scientific and engineering research and development facilities on Canadian soil. The lack of research facilities, and the associated encouragement of young scientists, will have an increasingly deleterious influence on our productive capacity, and on our ability to maintain adequate levels of employment. The problem is aggravated by large foreign-owned organizations who carry out their entire research programs abroad, and who attract some of the highest qualified Canadian university graduates to their laboratories on foreign soil.
4. The era of scientific management has dawned and, most importantly, computers will be increasingly involved in the decision-making process.

Clearly, unless there is understanding in depth of what automation is all about it is impossible to predict how it will evolve, and discussions of its future impact on society and what steps should be taken to ensure society's adaptation to technological change are essentially abortive. The extent to which the majority of industrial leaders understand even today's technology, let alone tomorrow's, is, I contend, minimal. Such understanding necessarily implies some knowledge of the concepts of management science and these in turn can only be described in terms of the new mathematical languages of management.

How is this preamble related to the role of the universities in manpower training with special reference to automation and social change? The main reason is because I believe the universities, as teaching and research institutions, have greater responsibilities for educating governments, industry and the general public, than ever before. For instance, if the universities fail to educate adequate

numbers of first-class scholars, scientists and professional men and to bring to bear their large reserve of intellectual talent on the massive interdisciplinary problems which confront us, we will be in serious trouble.

The universities have been largely responsible for the scientific discoveries, and for much of the basic technology, which have paved the way to modern automation — they must now, through interdisciplinary research, attempt to pave the way for society's adaptation to it. But we must not expect miracles because the adaptation to change of so highly complex an entity as modern society must necessarily be a long and agonizing process. Indeed, it is essentially a question of educating society to live with, rather than the ideal of adapting to, technological change.

The major roles of the universities in society's evolution are in teaching, research, and in service to the public. Indisputably, universities need to promote research and scholarships at the highest levels. It is a constant source of amazement how few people understand that in order to teach students at both undergraduate and post-graduate levels it is essential for university teachers to undertake research at the very frontiers of knowledge. It is desirable also for university professors to serve the public through extramural activities such as participation in conferences such as the present one. But I do not propose to consider these roles in detail, and indeed time precludes such an undertaking. Instead, I will reflect on some of the more philosophical aspects of our role.

Historical Notes

Historically, the universities' key role in developing the science and technology of automation is exemplified by recalling that rather more than 125 years ago Professor Babbage, at the University of Cambridge, designed in principle a general-purpose computing machine which embodied almost all the principles upon which the modern large-scale electronic computer is based. And Babbage also laid the foundations of modern industrial engineering and scientific management. And a few years later, Professor Clerk Maxwell laid the mathematical foundations upon which the whole of modern automatic control theory has been based. While in recent times the spectacular developments which have given rise to the modern electronic computer were based on fundamental work carried out at

the University of Pennsylvania and at the Universities of Cambridge and Manchester. Further, the whole concept of computer languages and libraries was born in university laboratories — not least in the Computer Centre of the University of Toronto.

Today, in university departments of engineering, economics, business administration and sociology, massive programs are in hand to study automation and its impact on the economic and social life of the nation. Note also that the study of automatic control systems, the grass roots of automation, has thrown new light on biological processes and medical research. One of the major tools involved in these investigations is the electronic computer.

There is little doubt that the science and technology of automation has outstripped our understanding of its social implications. In the social sciences we are not even in a position to despise apparently trivial problems if we hope to evolve methods such as those that have given exactness to the physical sciences. This exactness rests essentially on the application of mathematical techniques. At present in the universities we are fumbling and groping for the basic mathematical models which may one day open up the social sciences.

Educational Implications

Higher education has today reached new peaks of intellectual achievement. At university level the education of scientists, and professional people, is already calling for drastic modifications in curricula which were devised as recently as ten years ago. Each year ushers in new subjects and new methods. Our highly dynamic environment has resulted from the pursuit of knowledge as it has never been pursued before. This inevitably necessitates first-class university teaching and research staff. Indeed, at present, the problem of how to attract and retain these teachers is seriously exercising many university presidents.

Two related subjects are assuming tremendous fundamental significance in the fields of automation and its social implications and they deserve special mention. I refer first to the "new mathematics", including modern algebra, n -dimensional vector spaces, Boolean Algebra, etc. and second to the ubiquitous electronic computer which has made possible so many advances in science during the past few years. For example, from the points of view of the engineer and the

manager, modern algebra and the large-scale electronic computers have given rise to new philosophies of design and decision-making, in which the goal is to optimize the utilization of men and materials through the application of scientific and mathematical methodology.

As a result of such powerful new tools, the majority of graduates in engineering of only ten years standing are now out of date and, in collaboration with the professional associations, we are considering how best to up-date them. Similarly, the new tools are available to the social sciences, and here again the first steps in the application of computer methods to the study of important social problems are in hand. There is already evidence, for instance, that the potential of the computer in the study of medicare schemes, social welfare schemes, pensions, etc., is very great.

Time precludes an appraisal of the many other fields, including medicine, which may be revolutionized by the new tools (especially the electronic computer). Suffice it to say, the impact of the machines on education, at all levels, is likely to be considerable. For instance, the value of programmed instruction has already been proved and this new educational approach is being enhanced appreciably by computer programming techniques. Perhaps the programmed approach to instruction will prove especially valuable in the education of management, and in up-dating and vocational programs.

The Importance of Operations Research

During the past thirty years a new scientific and sociological discipline called "operations research", has proved of great value both in war-time operations and in industry.

At the beginning of World War II a few university scientists in the United Kingdom first devised operations research methods to minimize the effect of the manpower shortage, and to deal with the inability of military officers to understand new technological developments. The scientific method of quantitative and empirical thinking proved tremendously valuable in the utilization of such complex equipment as radar systems. Subsequently, the operations research methods were applied to the elimination of futile tasks, the programming of highly complex operations and the effective deployment of human beings and materials.

After World War II the potency of the operations research approach was applied to industrial processes, especially in the U.S.A., and it is already clear that the methodology represents a powerful tool which will of necessity become more and more widespread in the future. Although radar equipment is scientifically and technologically complex, it is far less so, in both operation and application, than the modern computer. And it is understandable why scientists are needed in increasing numbers to educate industrialists in the use of the new tools.

The operations research approach to management and organizational problems is predicated essentially on probability theory and statistical mathematics and hence offers an objective approach to certain decision-making processes. Operations research is proving a major reason why management is becoming more and more scientific. Although the power of operations research is effectively exploited in most industries in the U.S.A., and in many European countries, its acceptance by the majority of industries in Canada has been less marked. To stimulate operations research in this country the Department of Industrial Engineering, University of Toronto, has organized various teaching and research programs in the field.

Industry and the Universities

In several countries of the Western World, notably the U.S.A., West Germany, France, Switzerland and Sweden, close relations have been established between the industries of the country and the universities for the pursuit of joint research programs. However, in Canada, the universities are regarded by the majority of industrialists as merely a source of educated manpower. This is in contradistinction to the attitude of the federal and provincial governments in Canada which have consistently shown appreciable foresight and imagination in supporting, for example, university research programs.

Canadian industry contributes little to support basic research in the universities. It is not surprising that, on a per capita basis, Canadian industry only spends a fifth as much in research as industry in the United States.

In the United States many universities arrange symposia and seminars for the benefit of industrial leaders and professional men in industry. And, by and large, these are accepted and supported with

great enthusiasm by United States industrialists. On the other hand, in Canada, although symposia dealing with marketing, sales, advertising and business administration receive a fair measure of support from industry, subjects savouring of science and technology are by no means so popular. Last May, for example, the University of Toronto arranged a symposium intended for senior industrial executives. It was concerned with automation and research, and a panel of speakers, several of whom with international reputations in their respective fields, gave papers. The presidents and senior executives of more than 300 Canadian industrial organizations were invited. After a great deal of persuasion, including personal appeals by the President of the University, we succeeded in attracting 22 representatives from some ten enlightened Canadian businesses and industries. The whole object of this symposium was to acquaint senior Canadian industrial executives with the present state of the art of automation and its potential for the future. Lack of industrial support for university efforts to help in up-dating management in modern technology, and lack of interest in such vitally important topics is discouraging to say the least.

Fortunately, the above does not apply to one section of industry. I refer to the modern scientifically based and oriented industries in Canada which are growing rapidly essentially as a result of their confidence in Canadian scientists and engineers. But some of the older industries are tending to stagnate and may already be in a position of relative decline.

It must not be forgotten that the present wealth of the world is increasing largely because of science. We are witnessing in our time extraordinary intellectual adventures essential for the growth and survival of our society. Industry must not fail to cooperate to the limit with the universities or their competitive strength *vis-à-vis* industry abroad will be considerably weakened. Consider, for example, the massive new industries which have been built around, and inspired by, the universities of the U.S.A. — especially M.I.T.

Conclusions

It is a truism that, in the final analysis, our only ultimate resource is that of human effort of the physical and mental kind. The speed with which true progress can be achieved will largely be governed by the quality of the education provided to our population in all age groups

and at all intellectual levels. The part the universities will play in teaching, in research, in monitoring the progress of society, and in advising governments and industry, is likely to prove of inestimable value in ensuring the future economic well-being of the nation.

In *Automation and Technological Change*, a report published by the American Assembly, it is concluded that to adapt management and labour to the needs of the new technology, it will be necessary to increase substantially the number of scientists, engineers, teachers, doctors, and other professionals to develop management personnel equipped to understand the social and economic consequences of the new technology, and to adapt technology to the achievement of greater productivity. Furthermore, training programs for technicians, and the upgrading and modernizing of the skills of craftsmen and other workers are also recommended. The report also stresses the importance of improving the quality of elementary and secondary education. It is clear that the role of the universities in these matters will not be inappreciable.

It is certain that, in the future, we will be required to offer many more up-dating diploma courses, and a wide variety of short lecture and seminar programs especially for management personnel.

I suggest that in Canada the major need is for imaginative, inspired and courageous leadership in industry to ensure the full utilization of the fruits of the arts, science and technology. This will involve massive educational programs. It will involve also powerful inter-disciplinary research institutions, centred in the universities, for the study of contemporary and potential problems. The newly created "Centre for the Extensions of Man" at the University of Toronto is one such institution — headed by Professor Marshall McLuhan it will study global implications of modern technology with special reference to communications.

In some respects the "education for leisure" concept is defeatist especially when we reflect on the rapid increase in the earth's population. Vast enterprises, scarcely dreamt of at present, must be inaugurated in such fields as agriculture, energy conversion and distribution, the development of water resources, the irrigation of the deserts, the exploration of space, the education of the under-privileged nations. The present impact of automation on employment is surely transitory — to men of vision and enterprise a challenge of tremendous dimen-

sions is looming up. There will not be much time available for leisure.

Three hundred years ago the then very distinguished Lord Chancellor of England, Francis Bacon, said

“It is esteemed a kind of dishonour to learning to descend into an enquiry upon matters mechanical.”

Let us hope that Canadian industry, commerce and government will prove more enlightened than Bacon's contemporaries and, with a spirit of high adventure, ascend to the heights of achievement in tackling the social problems left in the wake of technological advance. This goal can only be approached through imaginative management based on a deep understanding of technological change.

THE OUTLOOK FOR SOCIETY

by PROFESSOR CHARLES E. HENDRY



Professor Hendry, who is director of the University of Toronto's school of social work, received his education at McMaster University, Columbia University, New York University and the University of Chicago. First Canadian to be appointed United Nations Fellow, he also gained recognition as commentator on CBC's award-winning "In Search of Citizens" in 1948, and as director of the University of Toronto's Round Table on Man and Industry, a unique research experiment.

Mr. Chairman, Honourable Ministers, distinguished guests and members of this conference:

Although some of you may have expectations to the contrary I will make no attempt to summarize, let alone synthesize, the ideas that have emerged during these three provocative, exciting and productive days, particularly in the light of my colleague Professor Porter's salutary estimate that fewer than three hundred persons in Canada understand automation in depth, and I am certainly not one of them. I would like to feel, however, that I do know something about the social consequences of such technological change. When you realize that machines displaced muscles, then later displaced minds and now machines in turn are displacing other machines, one is a trifle staggered by the complexity of the problem.

I do want to say, however, that I am trying hard to catch up and to learn about automation. For instance, this summer I went over to Douglas Point on Lake Huron to see the new atomic energy plant under construction there. Later I motored along the new Trans-Canada Highway on the north shore of Lake Superior. There again I visited several important automated industries such as the Algoma Ore Properties at Wawa and the Kimberly-Clark Paper Mills at Terrace Bay. I do get the feeling somehow that many Canadians lack precise knowledge concerning these developments in Canada. I was particularly conscious of this when Professor Porter this morning reminded us that in 1952 we had a three-year lead in electronic research and development and that right now we are ahead in the development and use of heavy water.

One can have great pride in this province and in this country. It is unfortunate that there seems to be a built-in pathological disposition on the part of many Canadians to depreciate and to disparage such developments and those who provide the leadership for them.

Some years ago, when I was in New York, teaching at Columbia University, our five-year-old niece came down from Toronto with her parents for a visit. She wanted very much to be taken on the subway so one day I took her for her first subway ride. Those of you who are familiar with the Broadway line will recall that at 96th Street you cross over from the local to the express tracks. Invariably the lights flicker and go out momentarily as the train crosses the switch. This probably was fairly early in the morning and I hadn't quite come to, but she turned to me at this point, very greatly concerned.

She said, "Uncle Chick, why do the lights go out?"

With a drowsy indifference, I said, "I don't know."

She was very angry with me and she said, "You tell me, you're big enough."

Well I'm not big enough and I doubt if there is anyone in this room big enough to answer the question when it applies to the immense dislocation we are experiencing as we switch our massive industrial society from the relatively slower local tracks of the first industrial revolution to the much speedier express tracks of the second industrial revolution in which we now find ourselves.

In a very real sense, if I may paraphrase a passage in *The Autobiography of Lincoln Steffens*, "Your job and mine in coming to this conference has been to organize our ignorance into a system."

I propose at this point to quote from one of my favourite poets and I intend to close my remarks in the same manner. Poets have an uncanny ability of going directly to the heart of a matter. They have an affinity with the mathematician and the philosopher. This passage is from a sonnet by Edna St. Vincent Millay. It has direct relevance in this setting.

"Upon this gifted age, in its dark hour,
Falls from the sky, a meteoric shower
Of facts: they lie unquestioned, uncombined,
Wisdom enough to teach us of our ill
Is daily spun, but there exists no loom
To weave it into fabric."

This is part of the reason that we have come together, to see if we can't begin to build a loom, a conceptional framework within which we can place many now unrelated facts and ideas and weave them into meaningful fabric.

It is appropriate, I believe, at the outset, and before I proceed any further, on behalf of all of us, to express a word of appreciation to the government of the province for the splendid, timely and strategic initiative taken in holding this conference; for the exemplary demonstration of interdepartmental collaboration; and for the efficient and effective administration of the conference, reflecting the quiet and unobtrusive efforts of men behind the scenes.

I have been agreeably impressed as many of you have been, with the very conception and design of the programme. It is a kind of reconnaissance or exploratory exercise. We want, if we can, to identify problems and to determine targets for later attack. We want to assemble facts and to look at these, to question them, to combine them and to build up coherence in our understanding.

I think we've been impressed by the vital and vigorous dialogue that has taken place and the highly competent participants representing labour, management, and government; educators, research scientists and scholars. Bergson once said that what we

most need are men who think as men of action, and act as men of thought. In a sense I think this is the kind of combination we have been approximating here at this conference. I have been impressed too with the imaginative use that has been made of new technological devices — those magnificent films the other evening making even more vital and vivid what we had heard from Nils Kellgren of Sweden; and the use of television over at Ryerson Institute, to enable us to project the impact of the conference itself out into the larger community. There is also the secondary value that arises just from contact with that great Polytechnical Institute which reflects so eloquently what we heard this morning from Dr. Ford, Mr. Johnston and others, concerning developments in Canada, in manpower retraining and adjustment.

The quality of contributions has been agreeably high, though we ran the gamut from the profound to the pedantic. There were brilliant insights and boring clichés, realistic paydirt specifics, on the one hand, and quite unrealistic and unrewarding generalities at the other extreme. We have witnessed both disciplined analysis and determined evangelism.

I think we're beginning to know how to use experts. Someone has said that an expert is a person who blows in, blows off, and blows out, but somehow or another the experts have stayed right here until now and that's good. I think rather what we have had here are minds on the move, and we've been extremely fortunate in the happy selection of the seven guests from outside Canada: Sir Geoffrey Vickers, Mr. Ewan Clague, Dr. John Dunlop, Mr. Nils Kellgren, Mr. Kenneth Brown and our two special guests last night from across the line. We've placed reassuring reliance on men within our own midst. You'll pardon me if I refer especially to Dr. Solandt. There's a magnificent blending of scientist, administrator and scholar, combined with abundant good humour, dignity and humility. He made, I think, a most impressive and valued contribution.

There is an awareness too, that among us, among our Canadian colleagues, there are men who have travelled very widely and who bring back to discuss with us the most up-to-date information concerning progressive developments in other countries. The utilization of Canadian documentation in the course of the conference has been exciting: the *Report of the Ontario Select Com-*

mittee on Manpower Training is a magnificent document; the *Report of the Senate Special Committee on Manpower and Employment*; some sections of the *Report of the Royal Commission on Canada's Economic Prospects* that deal directly with the problems that we're concerned with; a variety of technical papers from the federal and from other levels of government, notably Bill Dymond's *Manpower Implications of Technological Change*; university personnel, personnel from the Bureau of Statistics, from the Canadian Labour Congress, from the C.M.A. and the C.C.C. and from individual industries. This attests to the rich experience and documentation we can mobilize right here in Canada.

A couple of years ago, after a very busy day when I was in New York attending a conference, I saw advertised at the Plaza Theatre, at Rockefeller Centre, a film by Jerome Hill entitled, *The Sand Castle*, and I went over. It was a very simple film that concerned a little boy about eight years of age and his little sister of about four or five who were deposited on the beach, probably on the Mediterranean, in a station wagon by the mother who went off shopping. They made their way playfully down the embankment to the beach. All the little boy had, as I recall, was a filing knife. The little girl left him immediately and went down closer to the edge of the water, but he began building a sand castle. Exquisite design, magnificent dexterity in every movement of his fingers. He was a sculptor in the making and he was making a castle. There were many people on the beach going by who stopped and watched, but he didn't see them. At one point a whole bus load of nuns from an institution arrived with their black and white habits and their rather large, cumbersome head-gear to play baseball nearby. They didn't pay any attention to him and he didn't pay any attention to them.

Until at one point the ball was struck and it landed right square in the middle of the castle. Unperturbed, he took it and laid it aside and took a shell that gleamed like a diamond and placed it in the indentation that had been created. And it shone. By that time many people had gathered to watch the lad. They were quiet, almost solemn, as they looked upon this marvellous creation. The day moved on and finally you heard the horn of the mother's car, you saw the little tike clambering up through the rushes; but the boy, he just stood there. The sun was beginning to set. People were

departing. As the boy stood there beholding his handiwork the tide began to come in and the sand castle began to disintegrate. Erosion took place before one's very eyes and before his eyes. And I couldn't help but wonder as I sat there in the theatre and watched, what thoughts passed through that boy's mind as he watched his immense effort come to naught.

I have a feeling that this says something to us. Altogether too frequently we build our ambitious plans on foundations, on assumptions, that do not and cannot support the superstructure.

But I agree profoundly with Sir Geoffrey Vickers, "The most important, the most fundamental, the most revolutionary forces with which we have to work are ideas and moral values and abstract theories". Unless somehow or another we can build those into the very foundation of our planning, what we build will erode and will erode very quickly.

We need to be reminded that John Kenneth Galbraith has written an important book on *The Affluent Society*. We need to be reminded that Walt Whitman Rostow has written an equally important book on the economic growth of nations and that Paul Hoffman at the United Nations has come forth with the *Decade of Development*, "development planning" being the seminal concept built into the heart of it. Those who are not familiar with these books may not be aware that some very basic assumptions are being upset in the process.

Recently a distinguished professor at M.I.T. was asked the question, "What is the American way of life?" It is reported that his answer was, "Planned security for the rich; free enterprise for the poor". And you know, it may be that if we were to gather together all the relevant data and feed it into an electronic computer it might well demonstrate that there is some truth in the definition.

When the great social psychologist, Kurt Lewin, a gift of Hitler to this part of the world, died, a memorial service was held by the American Psychological Association. The then president of the Association affirmed on that occasion, "Kurt Lewin was to the social sciences what Albert Einstein was to the physical sciences". One of the things that Kurt Lewin kept saying and that underlined all his work is that there is nothing so practical as a good theory.

A year ago last August I was in Brazil for a month, and on a Sunday morning the son of a highly respected philosopher for many years attached to the University of Havana, the late Cuban ambassador to Brazil, Rafael Garcia Barcene and I were talking, as we went up the funicular railway to the Statue of Christ, about his father and about his father's ideas and his break with Castro and the rest. And he said, "The proudest document I possess is a learned article by my father entitled, *The Structure of Structure*".

This comes very close to system theory that Sir Geoffrey and Dr. Solandt and Dr. Porter have been talking about. Probably the most profound statement made at this conference, in my opinion, was made by Sir Geoffrey when he said, "That more important in a sense than the system is the setting in which the system finds itself".

A remarkable reprint has fallen into my hands this week, written by Professor Bernard J. Muller-Thym, a visiting professor at M.I.T., who is an industrial management consultant. It is a portion of an address he gave before the International Chamber of Commerce in Paris earlier this year, entitled *The Real Meaning of Automation*. This probably comes closer to a surrealist portrait than anything I have come across yet.

Let me quote a passage or two, more to disturb and provoke than to comfort. "One of the characteristics of the world in which we live is that property and work are disappearing. This process is going on inexorably; it is further advanced in some parts of the world than in others, but all parts of the world will be involved in it. Automation is accelerating the process, although automation did not bring it about. Property as a thing-type object is disappearing; it is doubtful whether any group of people in the history of the world could measure themselves against their ancestors of comparable wealth and find that they owned so little in comparison."

"Americans for example," he says, "at a startlingly increasing rate are leasing personal automobiles rather than owning them. . . . When the leasing company owns the car, but does not use it, and the driver uses it but does not own it, the result is something far different from classic ownership." . . . "At the same time work in the sense of servile work, is disappearing. It is futile to talk of relieving 'chronic unemployment'; the rate is going up, and it is going up much more rapidly than in the past decade. A substantial

amount of retraining is going to be necessary, for there is going to be a radical change in the skill mix of the people found in a business. But no amount of retraining is going to provide the amount of work that human beings now perform as sources of power, servo-mechanisms, levers, and things of this sort. No amount of work for human beings is going to replace the work that is being destroyed by automation."

"The task before us, therefore," he says, "is to invent a new kind of money, new institutions for the distribution of wealth. None of us is ready to describe what these new institutions will be — after all we have only now identified the phenomena. But one can describe something of what that society will be like and some of the design criteria for that money or those monies that will replace or supplement pay."

We have identified many areas of concern; we have chased a lot of rabbits out of the bush these last three days. There is a considerable divergence of views. We have inconclusive information. We acknowledge that our instruments of providing information are deficient. We do agree, however, on certain basic questions we must ask and try to answer. I have noted twelve:

1. What is Automation?
2. What is new about it, if anything?
3. What about the speed of its introduction?
4. What of the effect on production?
5. What of the effect on employment?
6. What about the effect on the structure of the labour force?
7. What about implications for manpower adjustment and for sharing the cost for such adjustment equitably?
8. What about labour-management relations?
9. What implications for education?
10. What about the new frontier of leisure?
11. What about the role of government?
12. What about the underdeveloped countries?

From this inventory of questions I have selected three areas, somewhat overlapping, to comment on, but I would like to preface my comments by a word about the reality of change itself. Nothing

is so certain as change, and yet nothing is feared more. We may have a certain hostility toward change, but we lack the capacity to understand and to control it. Our resources for the study of physical and biological change have been much more generously supplied than our resources for the study of social change. Without much doubt the greatest change, however, is in the rate of change itself. This actually is the most remarkable feature of world development today in science and technology.

Dr. Robert Oppenheimer is quoted by the Royal Commission on Canada's Economic Prospects in elaboration of this point, and I quote, "The greatest of the changes that science has brought is the acuity of change: the greatest novelty, the extent of novelty. Short of rare times of great disaster, civilizations have not known such rapid alteration in the conditions of their life, such rapid flowering of many varied sciences, such rapid changes in the ideas we have about the world and one another." Changes once measured in epochs and centuries now occur within a single generation or even within a single decade. Their speed, suddenness and spread stun the human imagination. And the problem is compounded by the fact that man lacks both the conceptual and the institutional equipment to cope with it.

So much has been written on the chain reaction of social consequences accompanying advances in science and technology that our discussion at this point can be reduced almost to a kind of inventory. Among the more critical concomitants one would most surely include physical mobility and the psychological tentativeness and reluctance to commit oneself to responsible involvement that seem to be a function of such mobility. A growing sense of alienation — alienation from meaningful, productive and satisfying relations with one's environment, natural, occupational and social, including alienation, in all truth, from one's own self. Closely related to this sense of not really belonging, of not really counting, and of not really being oneself, is a compulsion to conform and to consume, and this in turn bears a certain if unclear relation to our growing dependence on mass organization and mass communication.

We have grown accustomed to the term "fallout" in discussions of nuclear warfare. I would be inclined to broaden the use of this term and include in our inventory the psychological fallout that results from a calculated and distorted preoccupation with the

sordid, neurotic and sensational in human affairs. Sheer size of social structure and complexity of organizational operations give rise to bureaucracy and, in the midst of it all, the individual often feels further and further removed from decision making, more and more remote from the sense of effective control. All this provides essential background in considering some of the more specific impacts of automation and technical change.

I am going to turn now, briefly, to a consideration of youth, education and employment as a category.

In May, 1958, in Stockholm, a solitary citizen of the world stood alone to accept the Nobel Prize for Literature. Actually, as he stood and spoke on that occasion, he did so as a symbol and as a spokesman. He was not alone. He represented modestly, proudly, brilliantly, a rare blending of the spirit of rebel, prophet and artist in a new declaration of creative independence and a new dedication of social responsibility. I speak of Albert Camus.

Few men of our time have experienced man's aloneness so acutely or expressed man's deep anxiety with such sensitivity. Camus had journeyed through the wasteland. Happily, despite the spreading contagion of existentialism with its doctrine of absurdity and the pathetic withdrawal of the anxious and the alienated into the immobilization of fear and futility, here is an intellectual or here was an intellectual — unfortunately he was killed in an automobile accident—who escaped becoming a "cosmic hypochondriac". At one point in his brief and eloquent acceptance, he telescopes into a paragraph "more than twenty years of absolutely insane history," to use his own phrase. He confessed to having been lost, hopelessly, like all of his own age group in the convulsions of the epoch. He urges understanding of those "who through an excess of despair (have) insisted upon their right to dishonour and hurled themselves into the current nihilisms". Then he adds, "Probably every generation sees itself as charged with remaking the world. Mine, however, knows that it will *not* remake the world. But its task is perhaps even greater, for it consists in keeping the world from destroying itself".

For each of us there are moments or periods of time when we experience a sense of loneliness, deep anxiety, and utter futility. Some of us inevitably get caught in the psychological undertow.

Some get carried into the whirling vortex of life's turbulence. Some, happily most of us, struggle through the anguish of anxiety, find a secure footing and succeed in taking command of our lives.

Those of you who have seen that remarkable film "West Side Story" or who have read the August 27th issue of *Look Magazine* will have been reminded of this whole complex phenomenon. The title of *Look's* feature article is significant—*The Tense Generation, a shocking report on teenagers who are failures at 16, why they steal, why they destroy property, why they take dope and why they have declared war on society.*

Back in the thirties a Canadian Youth Commission was created, with the late Sidney Smith as its chairman, to study Canadian youth, their needs, their aspirations, their requirements. Its report ran into ten or twelve volumes. We might well dust them off again. As I look out on the age group we are here considering, three inescapable conclusions strike home. First, 15% of our youth, 11 to 17 years of age, today, are unwitting victims of rejection, deprivation and exploitation. They have become disenchanted, alienated, in a very real sense, exiled. Beaten and bewildered, they have become bitter and hostile. Reluctant rebels, they have become lonely, sullen, cynical and full of fear. By 1970, unless unprecedented steps are taken, their numbers will double to 30%. The similarity between the situation here, in the United States, and Great Britain is striking. It is significant also to note that the problems arise under conditions of affluence. These are not problems restricted to impoverished slums. Incidentally, there is a feature article in the *Globe and Mail* on the editorial page, today, on this very topic.

Second, the social costs involved in this massive neglect are fantastic. They begin with the psychic damage done to the individual, continued through the excesses of delinquency, crime and chronic addiction, and gradually ramifying into family disorganization, child neglect, marital conflict and mental breakdown. It is sheer stupidity to permit such a staggering social and financial burden to accumulate much longer.

Third, the present conventional deployment of our quite limited personnel in the healing, teaching and helping professions grossly fails in recognizing or meeting the desperately critical priority needs of many of our youngsters. Clearly our primary obligation

is to deploy our professional resources in the public interest, and not in the interests of conforming and making secure current institutional arrangements.

I want to draw attention to one rather unfortunate assumption which relates to education and our schools. Happily this is changing as we heard this morning. I am referring to our continuing, preferential support of general, academically-oriented, secondary education, and our reluctance to relate education more realistically to the changing character of our industrial society.

In Canada a comparison between the occupational distribution in 1958-59 and the trends in employment over the previous nine years is most instructive. In 1958-59 Canadian employment was distributed as follows: professional 9%; skilled 17%; white collar 29%; semi-skilled and unskilled 31%; all other 15%. The relative rates of growth leading up to that distribution are of even greater interest. Bear in mind, as I supply the figures, that the overall growth for all categories was 19% — professional 71%; skilled 38%; white collar 34%; semi-skilled and unskilled 19%; and all others, a *decline* of 27%. Furthermore, unemployment reports for 1960 in Canada showed an average rate of 7%. The rate among new entrants to the labour market (14 to 19 years of age) was 13%, or almost twice as high. The only other segment with a higher rate than the national average was the group aged 20 to 24, with an unemployment rate of 9.2%.

It is imperative that new social policies and new strategies be forged with respect to our youth. All of us, youth included, must be as clear about what we are for as about what we are against. Youth must be helped to discover a worthy image of society and to develop a worthy image of themselves. Morale awaits clarity of goals, conviction as to their importance and confidence in our combined capacity to achieve them.

Drop-outs in our schools must be drastically reduced. Systematic screening for early detection of children showing signs of emotional disturbance and deficiencies in social functioning must be broadened and accelerated. School administrators and teachers must be helped genuinely to understand the meaning of alienation and how it feels to feel deprived of the means to achieve normal and legitimate goals of human fulfilment.

A bridge must be built between learning and earning. Skilled youth counsellors in schools and in employment services are confronted with a gigantic task. New social inventions in this area await creative development.

Mobile, non-equipment field service must replace uncritical reliance on institutions and activity-centred programme facilities in reaching psychologically and socially alienated adolescents.

Social workers, especially skilled in working directly with gangs, the delinquent fringe and with the unattached, must be provided to man a coordinated network of experimental projects. Basic elements in the design of such an approach have been identified in pioneering efforts already recorded. We know how it could be done. We cannot afford to lose any more time. Langston Hughes might well have been talking about alienated youth when he produced those poignant lines from which a Broadway play borrowed its cryptic title:

“What happens to a dream deferred?
Does it dry up
Like a raisin in the sun?
Or fester like a sore —
And then run?
Does it stink like rotten meat?
Or crust and sugar over —
Like a syrupy sweet?
Maybe it just sags
Like a heavy load.
Or, does it explode?”

One of the reassuring announcements of the summer was made by the Minister of Education of this province that, in the light of these and related concerns, a Youth Bureau was to be established in the Department of Education.

The second area I would like to deal with for just a few moments is what might be termed, “Of Time, Work, and Leisure”. I had occasion recently to prepare an address for the Eighth Annual A.F.L.-C.I.O. National Conference on Community Services held in New York. The subject was “The Shorter Work Week”. I set down

a few observations at that time which I think might be of some use to us here. One does not need to be a profound, scholarly philosopher to realize, however interrelated work and leisure may be, that unemployment, not leisure, is the opposite to work, and that emptiness, not relaxation, is the opposite to leisure.

In a hard-hitting down-to-earth article in *The Nation* back in February 1958 with the cryptic title *Less Work—Less Leisure*, Harvey Swados draws upon his acute knowledge of the rubber workers of Akron to discuss this whole situation particularly in relation to enforced lay-offs, moonlighting and a possible further shortening of the work week. In the body of the article, with some caution but with no fundamental reservations, Swados quotes Arthur Schlesinger, Jr., as having asserted that "The most dangerous threat hanging over American society is the threat of leisure . . . and those who have the least preparation for leisure will have the most of it".

Over the years I have been intrigued by children at play, as you may now have discovered. Watching a child building with sand by the seashore, for example, as you have done probably many times, I have noted a kind of pure joy, spontaneity and abandon, a direct encounter with one's environment, an absence of organization and of conflict, and above all an intensity of interest that blocks out even an awareness that others are watching. Vaguely I have realized that this sort of activity which we call "play" is required for a child's personal and social development. It was not until I had graduated from university that I learned that Jean Piaget in Switzerland had made this a life study and that he had demonstrated with incredible scientific ingenuity precisely in what specific ways a child, through play, makes connections with reality and builds reality into his ego.

I am now coming to the view that what play is to a child's development, leisure is to a society's development. Johan Huizinga has devoted a whole book to studying the play elements in culture, and there have been other important publications recently on the meaning and implications of leisure which, I think, are extremely important.

Let me lay down just a few broad principles to guide us as we think about leisure as a subject for social policy determination in the wake of automation.

First, we tend to approach leisure negatively. This is painfully apparent in the phrases that have crept into popular discussion: the spectre of leisure; the leisure problem; the abyss of leisure; the great emptiness; society's blotting paper, and the threat of leisure.

Second, we are caught in a pervasive ambivalence in our attitudes toward leisure. Military and moral views centuries in the making condition us to spartan and puritanical patterns. Sanctions — scientific, artistic and social — compete in attempting to provide justification for leisure pursuits whether public, commercial or personal. Anxiety, frustration and guilt are part of the price we pay for our confusion.

Third, we are work-oriented, compulsively so, and what remains in time free from work is chiefly non-work, an escape from freedom and indulgence, or the vicarious experience of a spectator. Margaret Mead has put it neatly . . . "Man must work, then weary, take some recreation so he may work again."

Fourth, we are essentially incapable of approaching our leisure creatively. Most people are either too bushed or too bored at the end of their work to be capable of the effort to relax constructively. Serenity seems to have escaped us and aloneness soon disintegrates into loneliness.

And finally, we suffer from an excessive conformity to the values and the pressures of the market place. Our value structure has become saturated with status considerations and an insatiable appetite for material possessions. In the rat race to keep up and to keep ahead and to get on top a good many of us are in danger of losing both our identity, as individual persons, along with our integrity.

Finally, I do want to say a few words about social research and development planning, which I think by all odds represents the most important single tool or combination of instruments that we can use in pioneering and in carving out trails through the bush ahead. I have more notes on this than I can possibly make use of on this occasion. I am simply going to say, without reference to manuscript, that a panel of behavioural scientists was created in Washington a few years ago which has reported to the President's Special Assistant on Science and Technology, Dr. Jerome B.

Wiesner. The report of this panel is by far the most significant document of its kind I have ever seen in pointing up the relevance of social science research in relation to social policy. It has appeared in *Science*, the Journal of the American Association for the Advancement of Science in the April 20, 1962 issue — a brilliant document, and I covet for Canadians, who are interested in these matters, an opportunity to read it.

Dr. Porter this morning, in his remarks, referred to operational research. I would like to underscore what he said, because there are three elements in operational research that make it highly appropriate for a group like this to consider in this context. As I understand it, operational research involves first, the problem being identified by the operator, the administrator, or the person developing social policy. Second, the researcher moves in and he restates the problem in terms that make it possible to design a viable research programme. Third, at appropriate intervals along the way as the research is carried forward, the operator and the researcher communicate and collaborate so that when the research is done, instead of waiting for findings, some of the research findings actually get translated into results (applications) in the process. Industry has discovered this. Defence research requirements made it imperative. In the field of social policy, however, we have been very, very slow on the uptake.

Now I will close by referring simply and specifically to the title, given to this present assignment, *What is the Outlook for Society?* Just three things and I've hinted at them already. I would say that the outlook for society as we confront the great problems and potentialities of automation within the context of a rapidly expanding technology depends first on the clarity with which, together, we diagnose the situation and determine our objectives, in relation to emerging moral imperatives. That's number one: the clarity of our objectives. Second, the intensity of our conviction that these objectives, once determined, are really important. And third, the confidence we have in our joint capacity to achieve such objectives within the framework of planned, social change. This conference is a step in the right direction and I was pleased indeed when the Honourable Robert Macaulay referred to it as the first conference on automation. That surely implies there is to be a second.

Alfred North Whitehead, the great philosopher, has said, and I think it applies in a very special way to this conference and this is the essential point of it all, "The process is the actuality".

I said I was going to close with a poem and that is precisely what I am going to do. The poem is entitled *That Continent*, written by an Iowa poet, Paul Engle. He had a great affection for Carl Sandburg and there is something of the spirit of Sandburg in the man. The poem comes from a book of poetry entitled, *West of Midnight*, the title of the poem referring to that part of the world that lies west of Hitler's madness. In this particular poem Engle is speaking about North America, *That Continent*. We can think of Canada or we can think of Ontario, or Metropolitan Toronto or any Canadian community.

"The backward

Look is not ours, the longing for a past
Memory large, the eyes painted with pride.
We are no people desperate for the dead,
Mad for a gone name or ghost's mumble.
There is a future-frenzy in our mind.
Bone of our face, like the true Indian bone,
Lifted from onward looking.

Here we stand

On the cold sea-edge of a continent
Fronting the forest of all days to come.
Hearing from off that shore at night the wind
Blow with an old call of broken water.
We will not cringe in any hidden room,
Wrapped in the woven warmth of history.

We will go up into that empty land,
Not like those men who cleared a wilderness
By the forged axe head in a hickory handle,
But with the myriad power of machine,
Not the squirrel rifle, but the dynamo
Not the buckskin pony, but the daring plane.

For now, when the nations move back to the past
With the barbaric yell of tribal hate,
Ruled by the raving voice, the brag of blood
And there before our startled eyes we watch

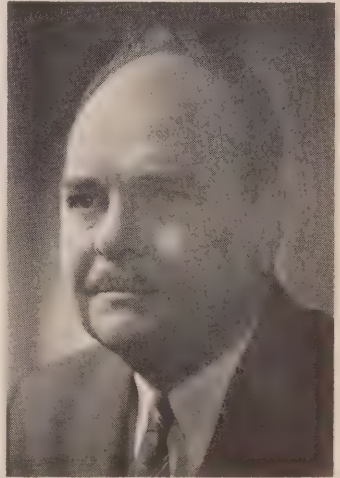
A stone axe hacking the electric years,
This plundered planet needs a hardened hope:
A strength to build the future in today,
Proving again the free mind in its power,
Here, in a land of steady western light,
Can build a bold tomorrow where all men
Will have such pride in living that no man
Need hunger for a human dignity."

CONCLUDING STATEMENT

by HON. H. L. ROWNTREE, MINISTER OF LABOUR

This Conference on Automation and Social Change has reached its last minutes. I believe you will agree with me that these have been a memorable and outstanding three days. From what I have heard, they have exceeded all our expectations, particularly with regard to the quality of information that has been brought forward and discussed. Interest has remained high and an enthusiasm and sense of direction has been generated which we cannot — we must not — allow to be dissipated or lost.

Although we have nearly concluded our business here today, let me assure you that the sponsors of this conference have no intention of allowing the important and vital matters, which have occupied us for the last three days, to be set aside and forgotten. This conference has been an excellent beginning which is attributed to the quality and excellence of the speakers who have addressed you and as well to you, the delegates, who have contributed immeasurably to the discussions and exchange of views.



I believe it is obvious to us all that some strong positive action will be required to maintain the momentum that has been generated here. I have held discussions with my colleagues, Mr. Macaulay and Mr. Davis, and we have developed such a course of action. It will involve the continuing support of all interested groups in our

province, because all will be needed and all will be affected by the developments both actual and pending that have been the subject of discussion here during the last three days.

Before we began this conference we fully believed that the best way to continue the work started at the conference was by means of a committee under the Ontario Economic Council, but it became clear to us as the conference progressed that even more is required and we are prepared to do it.

Therefore, I wish to announce today plans to establish a Foundation on Automation and Employment, which will be the organization designated to carry on the matters discussed at this Conference on Automation and Social Change. The foundation will be the body which will investigate and deal with the human and social problems associated with the introduction of automation and a rapidly changing technology.

In the first instance, the foundation will be established and supported by the Ontario government. It is our hope, however, that the foundation will be rapidly expanded and broadened through the voluntary participation and support of management groups, labour organizations, universities and all who are interested and concerned with the problems of automation and social change. We hope that all of you here today will offer your cooperation and support.

It is natural that the Province of Ontario, which includes 50 per cent of the manufacturing capacity of our nation, should be in the forefront and be the leader in this field. Indeed, we have shown this through our sponsoring of this conference. However, we have no intention to remain nor do we wish to be provincial in our approach. Both federal and provincial representatives were invited and have been in attendance here. It is our hope that the Federal Government and our sister provinces will also join with us in supporting the work of the Foundation on Automation and Employment. The foundation will cooperate with and make use of the experience of similar bodies in the United States and Europe.

Naturally, these ideas are imperfectly developed and the Government of Ontario can do no more than provide an outline today and take the initial steps to bring our plans into being.

The first objective of this foundation will be to disseminate to all our people the viewpoints and ideas which have been so ably expressed and discussed here this week. You, the delegates, can do your part and, indeed, you have a moral obligation to pass on to others the ideas and knowledge you have acquired here by your attendance. In this way, we need not lose the momentum that we have gained here and our people will know that something is being done to understand and to cope with the great problems of our fearful and uncertain future in this age of rapid technological change.

The second objective of the foundation will be to provide a meeting ground and forum for all groups—management, labour and the universities, who are concerned about these matters and who wish to do something about them.

Prior to the conference, letters were sent out to leading manufacturers, labour organizations and other groups in our province asking them to provide us with their views regarding the impact of automation. These reports are now coming in and they will form a valuable basis for the beginning of the vast amount of study and research which will be undertaken immediately.

Finally, the foundation will enter into discussions with the Federal Government and the National Employment Service to develop an effective early warning system for the purpose of limiting and controlling any undesirable effects resulting from our rapidly changing technology. This early warning system will be a clearing house through which we will receive advance notice of impending changes in factories and operations in order to provide us with sufficient time to work out alternatives to unemployment caused by automation.

May I now announce the first appointments to the Foundation Steering Committee which will operate under the Ontario Economic Council. They are:

Professor Arthur Porter, chairman of industrial engineering, University of Toronto, who will be chairman of the steering committee.

Mr. H. L. Shepherd, manager of training and salary administration, Canadian Westinghouse Company Limited.

Dr. W. D. Wood, professor of economics and director of the Industrial Relations Centre, Queen's University.

Dr. O. M. Solandt, vice-president of Hawker-Siddeley Canada Limited.

Mr. Russell Harvey, representative of the International Union of Office Employees.

Mr. James Black, eastern Canadian director for the Building and Construction Trades Department, A.F. of L. - C.I.O.

Mr. J. B. Metzler, deputy minister, Ontario Department of Labour.

Mr. S. W. Clarkson, deputy minister, Ontario Department of Economics.

Dr. F. S. Rivers, chief director of education, Ontario Department of Education.

ATTENDANCE AT THE CONFERENCE ON AUTOMATION AND SOCIAL CHANGE

1. SPEAKERS

EWAN CLAGUE, Commissioner of Labour Statistics,
United States Government

O. M. SOLANDT, Vice-President,
Hawker Siddeley Canada Limited

SIR GEOFFREY VICKERS, Author of "The Undirected Society"

W. D. WOOD, Professor of Economics and Director,
Industrial Relations Centre, Queen's University

D. G. WILLMOT, President,
Anthes Imperial Limited

KENNETH J. BROWN, President,
Amalgamated Lithographers of America

JOHN T. DUNLOP, Chairman, Department of Economics,
Harvard University

P. M. DRAPER, Vice-President,
Canada Iron Foundries

DAVID ARCHER, President,
Ontario Federation of Labour

NILS KELLGREN, Economic Adviser, National Labour Market Board,
Stockholm, Sweden

H. L. SHEPHERD, Manager Training and Salary Administration,
Canadian Westinghouse Company Limited

RUSSELL HARVEY, Representative,
International Union of Office Employees

JOHN I. SNYDER, JR., Chairman and President, United States
Industries Inc. and Co-Chairman of the American Foundation on
Automation and Employment

ALBERT J. HAYES, International President of International Asso-
ciation of Machinists and Co-Chairman of the American Foundation
on Automation and Employment

C. R. FORD, Director, Technical and Vocational Training Branch,
Department of Labour, Ottawa

L. M. JOHNSTON, Director of Technical and Vocational Training,
Ontario Department of Education

H. S. BRAUN, Principal, Lakehead College of Arts, Science,
Technology

ARTHUR PORTER, Chairman, Department of Industrial Engineering,
University of Toronto

C. E. HENDRY, Director of the School of Social Work,
University of Toronto

Introductory Remarks

HON. ROBERT W. MACAULAY, Minister,
Department of Economics and Development

HON. WILLIAM G. DAVIS, Minister,
Department of Education

Conclusion of Conference

HON. H. L. ROWNTREE, Minister,
Department of Labour

2. CHAIRMEN

Tuesday, September 17th, 1963

Speakers and panel: I. F. MCRAE, Chairman of the Board,
Canadian General Electric Company

Luncheon: S. W. Clarkson, Deputy Minister,
Department of Economics and Development

Wednesday, September 18th, 1963

Speakers and panel: M. BARKWAY, Editor and Publisher,
The Financial Times of Canada

Luncheon: J. B. METZLER, Deputy Minister,
Department of Labour

Dinner: HON. ROBERT W. MACAULAY, Minister,
Department of Economics and Development

Thursday, September 19th, 1963

Speakers and panel: HAROLD B. DEAN, Assistant Superintendent
of Secondary Schools, Toronto Board
of Education

Luncheon: F. S. RIVERS, Chief Director,
Department of Education

3. STAFF

Members of the Departments of Economics and Development,
Labour, Education and the Ontario Economic Council.

4.

DELEGATES

DR. J. W. ABRAMS, Associate Professor,
University of Toronto
E. G. ADAMS,
Economist
B. F. ADDY,
Province of Manitoba
A. K. ADLINGTON,
University of Waterloo
R. E. ALDEN,
Steel Company of Canada, Limited
MRS. A. ALLAN,
Board of Education for Town of Oakville
DR. C. ANDERSON,
Waterloo Lutheran University
MRS J. C. ARMSTRONG,
Central Peel District High School Board
E. T. ATHERTON,
Ontario Chamber of Commerce
R. W. BAILEY,
Amherstburg District High School Board
J. R. BANCROFT,
Centre Hastings High School District
E. J. BARBEAU,
McKinnon Industries Limited
DR. J. S. BARLOW,
Bay of Quinte District High School Board
E. R. BARRETT,
Computing Devices of Canada Limited
H. G. BARRIER,
The Stationery and Office Equipment Guild of Canada
A. J. BATES,
Canadian National Railways
W. E. BAYES,
Ontario Educational Association
R. BELL,
Canadian Labour Congress
J. B. BERGEVIN,
Quebec Government
B. BERNHOLTZ,
University of Toronto
G. C. BERNARD,
Canadian Manufacturers Association

DR. I. BERNOLAK,
Dominion Bureau of Statistics, Ottawa

A. B. BLACK,
International Business Machines Company

J. J. BLACK,
Building and Construction Trades Department, AFL - CIO

W. H. BLACK,
Ontario Hydro Employees' Union

R. BLAIS,
Sturgeon Falls High School Board

D. BLENKHORNE,
Shore Moffat Partners

B. BONNAR,
Waterloo Lutheran University

W. BOOTHROYD,
International Association of Machinists

K. R. BOULTON,
Canadian Plumbing and Mechanical Construction Association

A. C. BRADLEY,
South Peel Board of Education

R. B. BRADLEY,
Board of Education for the Township of North York

E. J. BREWSTER,

R. H. BROWN,
International Printing Pressmen and Assistants Union of
North America

D. BRYENTON,
Sarnia Board of Education

G. A. BUCHANAN,
Windsor Board of Education

M. BUCK,
Board of Education, City of Chatham

W. B. C. BURGOYNE,
St. Catharines Standard Limited

W. S. BUSH,
DuPont of Canada Limited

W. H. CAIRNS,
Canadian Telephone Employees' Association

E. C. CALDWELL,
Council of Printing Industries

G. W. CAMPBELL,
Molson Breweries Limited, Montreal

L. J. H. CAMPBELL,
 Board of Education for the Township of North York
 G. E. CARROLL,
 Waterloo Lutheran University
 E. CASSELMAN,
 Chairman, North Dundas District High School Board
 A. CEKOTA,
 Bata Limited
 S. L. G. CHAPMAN,
 York Central District High School Board
 C. P. CHASTON,
 Shell Canada Limited
 N. L. CHEESEMAN,
 Kirkland Lake Collegiate and Vocational Institute
 G. A. F. CLARK,
 Board of Education—City of St. Catharines
 J. B. CLARK,
 Hoover Co. Ltd.
 M. A. CLARKE,
 Board of Education of Township of Scarborough
 H. J. CLAWSON,
 Steel Company of Canada Limited
 A. T. CLEAVER,
 Simcoe District High School Board
 H. CLEMENT,
 Hawkesbury High School District
 D. W. COLEMAN,
 Wolverine Tube of Canada Limited
 J. M. COLLARD,
 Dominion Tar and Chemical Limited
 R. COMETTE,
 Ontario Paper Company Limited
 W. F. COOK,
 Kimberley-Clark Canada Limited
 C. CORBETT,
 Brinton Peterboro Corporation
 J. A. COUPS,
 Wolverine Tube
 G. K. COWAN,
 National Productivity Council
 REV. G. A. COWPER-SMITH,
 Orangeville District High School Board
 R. A. COZENS,
 Ontario Teachers Federation

J. H. CRAIGS,
 Ontario Federation of Labour
 MRS. W. A. CROPPER,
 Canadian Home and School and Parent Teacher Federation
 H. CROWDER,
 Board of Education for Sault Ste. Marie, Ontario
 A. C. CRYSLER,
 Board of Trade of the City of Toronto
 W. G. E. CUMBERLAND,
 Alliston District High School Board
 D. S. CUMMINGS,
 Board of Trustees, Nepean Township High School
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